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ABSTRACT

This paper focuses on instructional processes and the interactions of students and teachers found to be associated with higher achievement in the basic skills of students in urban schools. Current knowledge regarding the effects of particular classroom processes (instructional and organizational) is reviewed. The "Follow Through" program, begun in 1967 and designed to explore different approaches to improving the educational achievement of economically disadvantaged children, is discussed. On the basis of results from a number of the program's experimental sites, it is concluded that what occurs within a classroom does contribute to achievement in basic skills, good attendance, and desired childhood behaviors. A review of the California Early Childhood Education Program follows. Achievement data are presented for participating kindergarten through third grade students, and some conclusions regarding the effectiveness of individualized instruction are drawn. Another study on the teaching of basic reading skills in secondary schools is also described in depth. Data on student demographic characteristics, behavior, and academic performance, and on the inservice teacher training component of this program are provided. Finally, several other studies on achievement in relation to sex differences and cultural background are briefly reviewed. A bibliography is attached. (GC)

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WHAT DO WE KNOW ABOUT TEACHING AND LEARNING IN URBAN SCHOOLS?

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Volume 10

Effective Teaching and Learning In Urban Schools

Jane A. Stallings and Shirley W. Hentzell
SRI International

U.S. DEPARTMENT OF HEALTH,
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Foreword

This monograph is one of a series of papers on the issues of instruction and learning in urban schools that were presented at a conference held July 10-14, 1978, in St. Louis, Missouri, sponsored by the Urban Education Program, CEMREL, Inc., and supported by the National Institute of Education. It is our hope that both the conference and the series of fourteen monographs that resulted from it will assist educational researchers and school practitioners in identifying and analyzing instructional and learning problems in urban school settings, and will contribute to the development of strategies for the improvement of schooling for students.

Titled "What Do We Know About Teaching and Learning in Urban Schools?", the 1978 conference focused on an examination of research findings on the teaching-learning process in areas most germaine to and under control of the schools. The key problems to which the papers are addressed are the assessment of learning outcomes and the analysis of the relationships between instructional and other inputs and learning outcomes. Important contextual issues not under the full control of schools, such as community and parental involvement and the impact of federal and state governments in improving educational opportunities, were addressed at the conference as well.

The conference was conceived, in part, as an initial step in the development of a state-of-the-art review of the most critical issues faced by educators in urban schools who struggle with the morass of general educational problems, exacerbated by decreasing public confidence in large city schools, declining student enrollment, and increasing numbers of poor and minority students. While the conference does not exhaust discussion of the problems that are particularly significant in the urban school setting, it forms a convenient focus for viewing the larger issues affecting education in our cities.

The educational innovation and change growing out of more than ten years of effort since the passage of the Elementary and Secondary Education Act of 1965 -- the primary stimulus for federal support of research and development in education -- has had the least impact on the student populations typical of the urban school setting. With this concern as a primary consideration, ten months prior to convening the conference, CEMREL's Urban Education Program had begun work with a network of twenty big-city school districts and state departments of education in Illinois, Indiana, Iowa, Kansas, Kentucky, Michigan, Minnesota, Missouri, Nebraska, Ohio, Tennessee, and Wisconsin. Thus, the conference and the research findings of national authorities was undertaken to lay a foundation for future work in urban educational research and development and to undergird present efforts at improvement of schools in the region.

The Conference Design

To guide the development of the presenters' preparation of their papers, topical questions were prepared for them by Urban Education Program Staff and a paper format was recommended. Each presenter prepared a full paper based on the topical questions and results were summarized by the writers during general sessions of the conference. Because of a wide range of perspectives held on the conference issues, discussions precipitated by reactor panels composed of other prominent researchers, practitioners, and community leaders in education followed each general conference session. More than one hundred educational researchers and practitioners from across the country attended the conference. The invited participants came from school districts and state departments of education from nineteen states; thirteen institutions of higher education; four federal agencies; numerous educational laboratories and research and development centers; and seven social service agencies.

The conference was divided into two types of sessions: general sessions, wherein the nationally recognized speakers who wrote papers presented their summaries; and forum sessions, wherein reactors helped analyze the presentations and examine the concrete recommendations put forth by the general-session speakers. All participants were encouraged to present questions and reactions during these forum sessions.

Francis S. Chase, Director of Urban Education Studies, Dallas, Texas, gave the keynote address at the opening session of the conference, a banquet on Monday evening, July 10. His topic, "Promising Developments in Urban Education," summarized field studies that he was conducting under sponsorship of the Council of Great Cities Schools and the University Council for Educational Administration under a grant from the Spencer Foundation. Chase is Professor Emeritus of the University of Chicago, where he also served as Chairman and Dean of Education for ten years.

The Conference Topics

Each of the presenters had been asked to design a paper by responding to salient topical questions, drawn up by CEMREL's Urban Education Staff. The questions that were posed originally for each of the writers are presented below. Most of the resulting papers were developed into monographs for this series.

Compensatory Education: A Congressional Perspective Christopher T. Cross Minority Staff Director Committee on Education and Labor U.S. House of Representatives.	What is the current state of the evidence concerning projected changes in legislative mandates, and what may we expect related to changes in policy governing federally funded compensatory education programs?

Effective Teacher-Support Systems to Improve Instructional Conditions in Schools Joseph D. Liggins Assistant Superintendent for Staff Development Houston Independent School District	What teacher support systems are most effective in improving instructional conditions for students? What is the role of in-service training, and what types of in-service training can be recommended to urban educators? What other resources--such as additional curricular materials, support from teacher aides and volunteers, time re-allocations, team teaching arrangements, etc.--can be demonstrated to be effective in improving students' learning opportunities? What is the state of the evidence?
Assessment That Respects Complexity in Individuals and Programs Judah L. Schwartz Professor of Engineering, Science and Education Massachusetts Institute of Technology	How can we best measure and analyze the effects of instruction on students' learning in the major school subjects: What are the most appropriate times and strategies for measuring the effects of schooling on student learning? What do we learn from means of assessment other than standardized achievement testing? When and under what circumstances is it most appropriate to use alternative or complementary strategies for assessing program effectiveness?
Achievement Tests in Urban Schools: New Numbers Eva Baker Director Center for the Study of Evaluation University of California, Los Angeles	How can we best measure and analyze the effects of instruction on students' learning in the major school subjects? What are the most appropriate times to measure the effects of schooling on student learning? What are the cautions which should be taken into account before any attempt to evaluate the effectiveness of programs primarily on the basis on standardized achievement data, especially when the number of individual implementations is large and the actual conditions under which the implementations took place are not well documented?
Summer Drop-off and The Effectiveness of Compensatory Instruction Paul T. Hill The Rand Corporation	What has the era of compensatory education program development contributed to knowledge about achievement in the basic school subjects in urban schools? Where is the evidence? What, if anything, does the evidence indicate about methods for improving basic skills achievement? What, if any, recommendations can be made to school district planners on the basis of existing evidence?

Instructional Ingredients for the Development of Beginning Reading Competence Isabel Beck Co-Director Learning Research and Development Center University of Pittsburgh	Much research, program development, and implementation of efforts to improve achievement in basic school subjects has been concentrated in the area of reading. What approaches to instruction in reading have been successful in increasing achievement? Is there evidence that certain approaches are best suited to the needs of particular populations? Do these effects generalize to other areas of school learning, such as mathematics, social studies, and science?
A Discussion of The Literature and Issues Related to Effective Schooling Ronald Edmonds Director Center for Urban Studies Graduate School of Education Harvard University	Are there schools that have demonstrated a higher degree of effectiveness in the delivery of instruction in the basic school subjects than others serving similar student populations (in terms of socioeconomic backgrounds, family characteristics, minority populations, etc.)? What characteristics distinguish these schools from less successful schools in similar situations? What is the evidence that the explanatory characteristics have been correctly identified, and how strong is that evidence?
The Educational Promise of Cultural Pluralism Vera John-Steiner and Larry Smith Department of Educational Foundations College of Education The University of New Mexico	How can we approach problems of teaching and learning in urban schools so that the racial and cultural diversity of the school population is recognized, respected, and utilized constructively, to the extent possible? How do we differentiate between basic academic skills, which all students need to acquire for successful participation in our hetergeneous society, and curriculum decisions which can and should be tailored to the needs and interests of different sub-cultural groups? Do students benefit from participation in racially and culturally hetero-geneous classrooms, or perhaps from certain kinds of heterogeneous instructional settings but not others? What is known about these issues, and how much consensus is there about the cultural values on which schooling must be based?

New Perspectives on School District Research and Evaluation Catherine Lyon Center for the Study of Evaluation University of California, Los Angeles	What is the role of research and development processes in improvement of instruction and learning in basic school subjects in large urban systems? In what form are these processes being applied to the teaching and learning process in urban schools? What is the evidence and how solid are the indications that use of these proceses has resulted in improved student achievement?
Effective Teaching and Learning in Urban Schools Jane A. Stallings and Shirley W. Hentzell Stanford Research Institute	Looking specifically at the interaction of student, teacher, curricular and school organization characteristics, what instructional conditions encourage achievement in basic school subjects? What evidence is there, and how good is it? How are the effects of instructional conditions on student achievement measured? On the basis of existing evidence and trends, what recommendations can be made for improving students' instructional environments?
Mathematics and The Urban Child Marilynn Suydam Center for Science, Mathematics, and Environmental Education The Ohio State University	Mathematics is a school subject which is generally considered basic, insofar as mathematical skills are required for successful adult functioning in our complex society. What evidence is there to indicate which approaches to instruction in mathematics have been successful in increasing achievement? Is there evidence that certain approaches are best suited to the needs of particular populations? Do these effects generalize to other areas of school learning, such as reading, social studies, and science?
Basic Skills in Urban Schools: A View From The Bilingual Classroom Concepcion Valadez Graduate School of Education University of California, Los Angeles	Since the second largest minority population served by many urban school districts is a bilingual population, what is the current state of the evidence about the effects of programs developed especially for bilingual students? What, if anything, does the evidence indicate about the effects of such programs on basic skills achievement?

School-Community Relations and The Urban School Dean Bowles Director Home-School-Community Project Wisconsin Research and Development Center for Cognitive Learning	What do we know or what can we learn about the influence of parental and community involvement in schooling on student achievement? How does parental and community involvement affect the teaching-learning process? If information is not available to answer these questions on even a tentative basis, what types of research are recommended to study this aspect of students' lives more effectively?
Frank Sobol Basic Skills Group National Institute of Education	Are there research and development products which have contributed to improved instruction and increased student achievement in basic school subjects in large urban school systems? What is the evident and how solid are the indications that use of these products has resulted in improved student achivement?
A Summary of The Conference Findings Edmund W. Gordon Director Institute for Urban and Minority Education Teachers College Columbia University	In light of the evidence produced by examination of these issues, what concrete recommendations can be made to school districts concerning the improvement of instruction and learning in basic school subjects? In light of the same evidence, what research and development agenda should be the focus of future study and program development?
Dr. Francis S. Chase, Director of Urban Education Dallas, Texas	Keynote Speaker for Conference Banquet: "Promising Developments in Urban Education"

--Harriet Doss Willis
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Effective Teaching and Learning In Urban Schools

Jane A. Stallings and Shirley W. Hentzell
SRI International

I. INTRODUCTION

The problems of survival for teachers and students have escalated during the past 20 years, and for the first time in a century, the survival of the public schools themselves may be in doubt. It is time to ask why we have battered teachers as well as battered children, and whether it is penury alone that makes the citizens of Columbus and Cleveland turn down new taxes needed to keep the schools open. Schools seem to have become the focal point of a wide range of community frustrations, anger, and disappointment--expressed in vandalism, arson, and fights as well as in the refusal of votes to levy taxes and pass bond issues that would help schools.

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We are in danger of losing a century-old public school system--not because of public apathy or ignorance, but because the public says we have lost sight of what schools are for. If schools are used primarily as agents of social change, then what is the institution that teaches our children to read and write, and to do arithmetic? If the schools graduate the illiterate and the innumerate, then how much social change can we really expect--and in what direction?

Since the inception of the Civil Rights Movement, schools have been used to bring about social change. In response to outcries against unequal education in the 1950s and 1960s, the federal government allocated millions of dollars to educational programs to compensate for that unequal schooling. But the result was not that schools immediately got better; the result was that schools became different--they became the playgrounds for ideas of innovative educators. In part, this reflects the way the federal government dealt with controversy about the best way to teach the disadvantaged: Give all ideas a chance. Intervention programs such as Title I, Title III, Title VII, Head Start, and Follow Through were set up to reward the implementation of pet theories. And while it may be true, as Kipling said, that "there are nine and sixty ways of constructing tribal lays/ And every single one of them is right," it is demonstrably not true that all ideas about how to educate the disadvantaged are equally effective.

It is not difficult to look back now and say that perhaps the federal government should have been more cautious in funding experimentation, but it is essential to remember that--in the absence of sound research data on educating the disadvantaged--there was little to go on but the best guesses of committed educators. As a result, many schools wholeheartedly embraced the notions of open education; they built open-classroom schools, bought many new materials and self-teaching machines, formed team teaching units, and adopted a holistic approach to teaching the child. The children did not flower as theory said they should; some blamed the children, others the teachers, and some the theory.

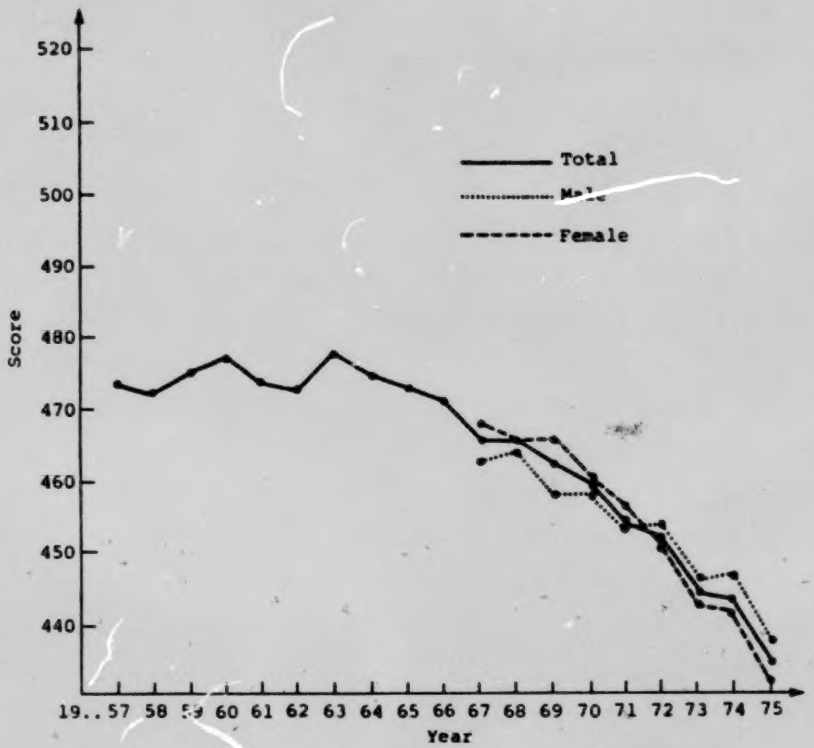
Initial studies of the total school programs concluded that much of the money spent to provide better libraries, laboratories, school services, and staff training did little to improve the achievement level of the students (Coleman, 1966; Herrnstein, 1971; Jencks, 1972; Mosteller & Moynihan, 1972). In fact, to the horror of the adult population, the test scores of all college-bound students began to go down. Figures 1 and 2 present the findings of Harnischfeger and Wiley on scores for college-bound students and reading scores for the general population, respectively.

The cause for the drop in test scores is not altogether clear--it may indeed be related to inadequate testing, too much television, broken homes, drug use--but clearly, the public blames the schools.

The first evaluations of school programs used the school as the level of analysis and considered achievement test scores only as outcomes. However, it became apparent that within schools--even within open classroom schools--some teachers helped children to learn year after year even in the most difficult urban school situations and practically regardless of the children's learning difficulties. These classrooms became bright spots scattered through a dark sky.

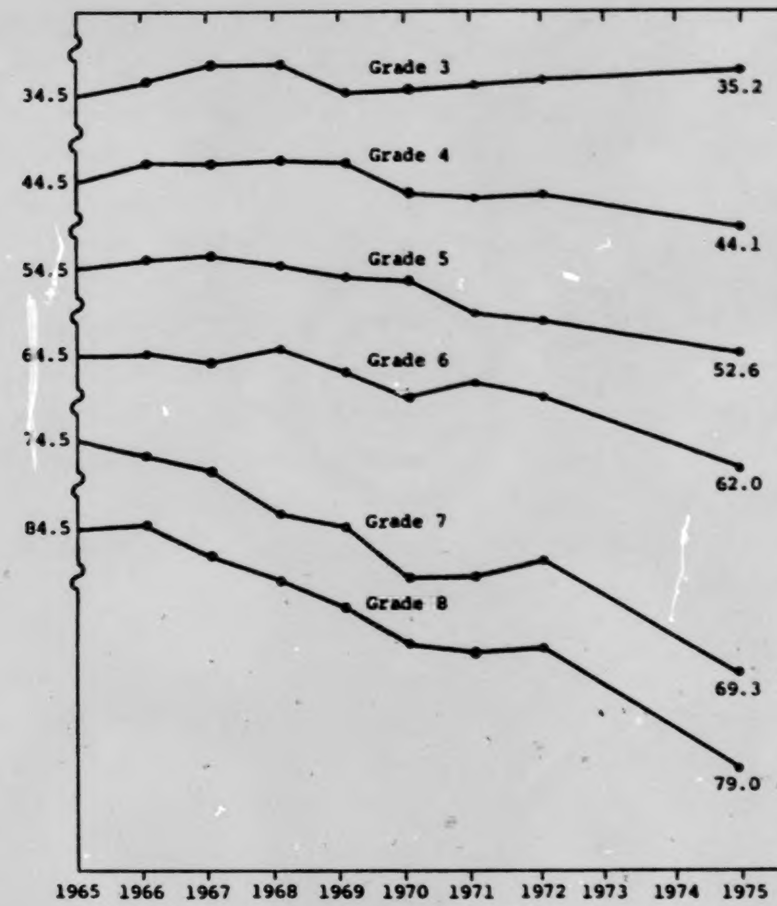
It became apparent then that even though we knew that students in Classroom A achieved more than students in Classroom B, we didn't know what specific factors made Teacher A more effective than Teacher B. And although teaching has long been regarded as an art, and good teachers have been considered to be gifted or inspired, we have stopped short of saying that "teachers are born, not made." If that were true, teachers' colleges would be nothing but a waste of resources.

We could ask the teacher, but good teachers are often inarticulate about their gift, and can neither define their magic nor impart it to others. Even when they are articulate, still they can give only a subjective view of what the magic is made of. To remedy this, several studies were funded to look at classrooms and document what was occurring there.



Source: Annegret Harnischfeger, and David E. Wiley, *Achievement Test Score Decline: Do We Need to Worry?* (Chicago: ML Group for Policy Studies in Education, CEMREL, Inc., 1975).

Figure 1. Mean Verbal Scholastic Aptitude Test scores for college-bound seniors, 1957-1975.



Source: Annegret Harnischfeger, and David E. Wiley, *Achievement Test Score Decline: Do We Need to Worry*? (Chicago: ML Group for Policy Studies in Education, CEMREL, Inc., 1975).

Figure 2. Trends in third- through eighth-grade student ITBS reading test scores from 1965-1975 (expressed in 1965 base-year grade equivalents on the Iowa Reading Subtest).

Most of these have been conducted in the elementary schools because that is where much of the state and federal intervention funds have been directed. Recently, however, the National Institute of Education (NIE) has funded several studies of teaching effects in secondary schools. Four observation evaluations conducted at SRI International (Follow Through, California Early Childhood Education, Teaching Basic Reading Skills in Secondary Schools, and Women and Math) will be highlighted in this paper because these are the studies in which the author has been directly involved.

Barak Rosenshine (1977) and Donald Medley (1977) have synthesized most of the important current studies of teaching effects. This paper will not repeat those reviews; however, findings from the current work of researchers such as Carolyn Evertson, Diane Lambert, and Linda Anderson of the University of Texas, Tom Good, and Doug Grouws of University of Missouri, and Jere Brophy of Michigan State University will be compared with findings in the SRI studies.

Our own experience leads us to believe that classroom environments can be described accurately through the use of systematic observations. The researchers responsible for the other studies described in this paper have also paid careful attention to the development of their observation systems and the quality of their data. Observation methodology, once considered as providing only soft data, has gained a respectable position among the tools used for measuring human events.

The focus of this paper is upon instructional processes and the interactions of students and teacher in programs found to be associated with higher achievement in the basic skills of students in urban schools.

II. WHAT HAVE WE LEARNED?

The studies in classroom process have followed a logical progression. In the Follow Through Observation Evaluation (from 1971 to 1974) we learned that the implementation of specific education models* could be measured and examined and an implementation score could be assigned to each classroom. This was a first for research in classrooms. We learned that implementation of specific programs was more difficult in large cities than in smaller cities or towns. The models that were more structured and teacher directed were implemented more successfully and were more efficient in teaching basic skills to children in the large city schools.

The length of the school day was positively correlated with achievement and is an important variable to consider: Harnischfeger and Wiley (1976) concluded that the 5 extra minutes a day (adding up to 3 full days of schooling over an entire school year) make a difference to achievement scores.

More time at school allowed for more instruction time. The amount of time teachers actually allocated to academic instruction varied from 81% of the school day to 41% of the school day. Those children who spent more time in academic instruction showed higher gains on achievement tests.

Another important finding was that specific classroom processes could predict specific student outcomes. Teaching of reading and math at the first and third grade levels was more efficient if the teachers were highly specific in instructions, worked with small groups, and kept the students engaged in the academic activities for up to 50% of the school day. Studies by Brophy, Evertson, Crawford, and Sherman, (1975), and Good (1978), corroborated these findings.

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*Follow Through funded 22 models of education, each with its own theory, practice, and expected outcomes.

Third grade students were found to perform better on a test of nonverbal problem solving in classrooms where there were more opportunities to explore with manipulative materials and equipment. These processes are more frequently found in open classroom models.

The California Early Childhood Education study provided findings similar to those of the Follow Through study regarding reading. Some differences were in the use of aides: Where the ratio of students to adults was as low as 0:1, the student gains were higher. There seems to be a break point, rather than a continuum; that is, 15 or 18 students to 1 adult does not make a difference, whereas a ration of 10:1 does. As in Follow Through, even with a low ratio of students to adults, it is not efficient to spend a large proportion of time working with only one student. Small group or large group instruction seems to keep more students working on-task more of the time.

In the Study of Teaching Basic Reading Skills in Secondary Schools (1978), we found that students who entered the class with different reading abililties required different teaching approaches. For example, secondary students reading on the second or third grade level fared better in classrooms where the teacher had them read aloud in small groups, offered several activities during the period, gave short quizzes frequently, and provided frequent supportive feedback. Students reading at the fourth or fifth grade level prospered more in classrooms where the teacher taught to the total group more frequently, provided information, conducted drill and practice sessions on encoding and decoding skills, and provided ample supportive feedback. Students reading at the sixth, seventh, or eighth grade level obtained higher reading scores when they were given more independent work, i.e., reading books at leisure, writing stories, or leading and participating in group discussions.

In all cases, the students thrived more in orderly, supportive classrooms where the teacher provided feedback for corrections. If a student said, "I don't know," it was important for the teacher to ask the question again in a different way, or take the part of the answer that was correct and assist the student to a successful completion of the interaction. Secondary students who have a history of failing need daily successes to change their experience and attitude toward reading.

We also learned that very few secondary teachers have had training to teach reading. They are very willing to do the work but they need workshops to learn to diagnose problems of perception, sight, or hearing, and then to prescribe a treatment. This is necessary since so many schools no longer provide these services for secondary students. The only student information many teachers receive is a reading grade placement. The tendency is to cycle the students back through the standard reading textbooks and programs, even though they may have failed again and again with these same textbooks and programs.

Also, few teachers are prepared to deal with the extreme behavior problems found in classes of remedial secondary students. Workshops on behavior management are badly needed to help teachers learn strategies for motivating good behavior and achievement. The evidence that learning does not take place in disorderly classrooms appears conclusive.

We did not find evidence that heterogeneous grouping or mainstreaming was advantageous to anyone in remedial reading classes. (Such grouping plans were initiated for social, not academic, reasons.) Teachers who had to work with students varying from the second to twelfth grade reading level showed less class mea[illegible]in than did teachers who had a more homogeneous group of students. In heterogeneous classrooms, it was the students who scored over the 49th percentile who made the least gain. Teachers reported spending most of their time with the students who needed help most. The others were left more on their own much of the time. In heterogeneous classrooms, the most successful teachers tended to group by ability, so they could handle the diverse needs of the class. Several teachers reported the distress of mentally retarded students, now mainstreamed. Teachers seem not to be prepared to deal with the additional problems. Our study has produced several examples of such situations. One high school girl is reported to weep almost continually and one boy cannot sit in his seat but wanders about the room aimlessly throughout the period. With 25 other students, the teacher cannot provide the close attention these students are accustomed to and must have if they are to progress.

In addition to the importance of these specific teacher behaviors in improving student learning, our research suggests that other approaches may be related to the achievement of women students and Hispanics. From a survey of high schools in our study of Factors Influencing the Decision of Women to Enroll in Elective Mathematics Classes, we found that a higher percent of women are taking the advanced math courses in inner-city Oakland where a program to involve students in mathematics, engineering, and science exists (MESA). Any students who show an interest in these areas are encouraged to participate in the program. They are given special tutoring and high-interest experiences to see what careers in these fields are like. This has been effective in motivating and preparing many more black students from Oakland Tech to enter four year colleges and major in math or science. Students graduating from MESA in 1975 were still in college in 1977. (The analysis of the classroom processes and student outcomes in math classes have not yet been completed.)

Research on Hispanic students suggests that as a group they may be more field dependent in their approach to learning. This suggests that they need to see a total picture to understand the parts and that they need consistent support and feedback from the teacher. Since they are quite family oriented, they are thought to perform better in classrooms where the teacher is warm and responsive and the students are encouraged to cooperate rather than to compete. More research is needed to substantiate these hypotheses and to identify other populations that would benefit from this approach.

While most of the findings regarding teaching and learning have come from large correlational studies, the results are from a number of different sources and are consistent enough to be believable. Recently, carefully executed experiments by J. Crawford et al. (1978), Good (1978), and Stallings, Cory, Fairweather, and Needels (1978), using control and experimental groups of teachers, have tested the correlational findings. The experimental group of teachers has been provided instruction on how to organize, manage, and instruct classes in reading or math. The results of J. Crawford et al. (1978) and Good (1978) indicated that the correlational findings can be put to efficient use in the classroom. We await the results of the Stallings, Cory, Fairweather, and Needels study to see whether the students of the trained teachers gained more in reading than did the students of the control teachers.

In the meantime, the results we have obtained to date have clear implications for the teaching of teachers. First, teachers must be assisted as necessary to develop class management skills. This means not only keeping order in the class, but establishing a supportive, rather than a demeaning atmosphere and keeping conflicts and disruptions from occurring. All of the no-gain or slight-gain classrooms had high rates of students' socializing, negative affect, and more interactions dealing with behavior. Teachers need to be helped to gain skills in motivating students to keep working and to achieve daily. Workshops at the high-school level did assist teachers in lowering the frequency of negative behavior, lowering the amount of student socializing, and increasing the students' time on task. Based upon our experience with 51 teachers, we believe that class management skills can be taught, but judging from the teachers' reports, these skills are rarely taught in teacher colleges.

Management skills do not imply teaching with a fierce and heavy hand. Good class management does mean making clear from the first day of class the rules and the penalties for breaking the rules in the classroom, and applying those penalties consistently. The teacher who expels two students after two months of intolerable behavior might not have had to experience those two terrible months or resort to such a severe act if she had told the class on the first day the penalty for such behavior. Clarity and consistency in enforcing classroom rules are of primary importance. Students must understand the rules and feel they are fairly applied. Once the rules are clear, then the teacher must have every minute well planned from the moment the students walk in the door until they walk out. No student should feel uncertain about what to do. Assignments need to be posted on the board or in student folders, and what to do when the assignment is finished must be stated. Students need to know on a daily basis how they are doing, i.e., they should receive an evaluation of homework, or a short quiz. Charts or graphs of daily student achievement seemed to be an excellent motivation. Students like to hear and see their progress. Charts for classroom behavior also serve as a good motivation. Many teachers reported classroom behavior improved after they started using charts that illustrated each student's daily score on a selected set of behaviors (being in their seats when the bell rings, getting work completed on time, not making derogatory statements about each other during class).

Grouping students in order to work effectively with them is an important part of classroom management. Working with one student at a time was not found to be as efficient as it might seem, since when the teacher is attending to one student, other students may not receive the guidance and supervision they need. Effective grouping depends upon the ability to diagnose and prescribe treatment. Again, too few of our teachers have received training on how to group students according to abilities. As school budgets get cut and the counseling and guidance services diminish, teachers are left very much to their own devices. Therefore, inservice training must be provided for our classroom teachers; it is essential that they have the skills required to assess learning styles or perceptual disabilities and to select a proper program for the student. It is wrong to apply a single program or curriculum to all students and simply allow students to progress through at their own pace; one style or size does not fit all. In any remedial basic skills class, a teacher should ask why each student is failing: Is there a problem of sight? hearing? perception? distractability? The answers to these questions are important, in addition to knowing if students need to improve encoding, decoding, or vocabulary skills.

We found no evidence that any one curriculum or program is the best one to be used in elementary schools or high schools. However, there is ample evidence that how teachers manage classes is fundamentally related to how much achievement students will make in gaining basic skills.

If school administrators are serious about providing schooling in basic skills, then some decisions regarding class size and ratio of students to adults should be made. It is reasonable to assume that teachers of students who are deficient in basic skills can do a more efficient job of teaching if they have 10 to 15 students, rather than 25 to 35 students. Classes of more adept students can be larger, so that the district ratio of teachers to students could remain at 1 to 35, but small classes for the less able are essential.

Teachers need adequate space to teach. Of the 51 teachers in our study of secondary reading classes, 28% had to rotate from room to room for 6 periods, carrying all of their materials with them. Seniority systems seem to prevail in many schools; teachers who have been there longest have permanent rooms, while newer teachers must rotate. A teacher of reading needs a room with books, and with diagnostic materials and progress charts on the wall. This cannot be accomplished in a rotation system. Room assignments may need to be mandated, since few ensconced teachers will want to give up their rooms. It is almost as if we had inadvertently placed as many barriers as possible in the paths of teachers who have been enlisted to teach remedial reading.

With the advent of the state-mandated proficiency exams in basic skills, the onus has been taken from the student and placed upon the teachers in the schools. If the student fails the proficiency exam in junior high school, a teacher must sit down with the student and parent and describe the remedial program the school will provide for the student. If the student fails the test both times it is offered in high school, the same process must take place.

The point is that schools must provide an adequate instructional program to remedy the student's deficiency in basic survival skills. One California junior-high school principal has said, "The buck stops here. Any student who does not pass the proficiency exam will be provided with special tutoring and Saturday classes (taught by volunteers from the university community) but no student will pass on to high school without passing the test." It took courage to take such a hard line in a society that has come to accept passing on students, regardless of their capability. The parents and students in this school will count themselves among the fortunate as students experience progress rather than failure from being ignored.

We don't mean to disregard the importance of social and psychological reasons that have prompted many of the laws governing school policy, but those laws must be examined in the light of student achievement:

- The policy of passing children along in the early grades may have led teachers to give up too easily on the child with learning problems.
- The policy of heterogeneous grouping may have a good social effect on students in some classes such as history, government, or language development, where ideas are discussed, but to apply this rule to grouping in reading classes in secondary schools is detrimental to student achievement.
- Mainstreaming of handicapped students was based upon good social and psychological reasons, but first reports from classroom teachers are that, though they are willing, they are unprepared to assist these students with the special attention they require to make progress.

Each time the pendulum of educational values swings from academic excellence to social psychological development and back to academic excellence, the benefits to students in each type of schooling seem to be ignored. The tendency is to make rules that apply to all situations, e.g., all class sizes will be the same, all classes will be heterogeneously grouped, all handicapped students will be mainstreamed into all classes. Next year the results of these policies might be so devastating that a new rule saying none of these policies should be followed is made.

We recommend that the pendulum stop in a middle position, where differential rules can apply to varying curriculums offered in schools. The teachers of children have a special trust, and it is in our interests to assist them in helping children grow and develop, and to become functioning citizens, able to enjoy life in a democracy.

III . WHAT--AND HOW GOOD--IS THE EVIDENCE THAT INSTRUCTIONAL PROCESSES MATTER?

Documenting what goes on in the classroom, and then identifying from the record a number of variables allows us (with the help of a computer) to test each variable against results on standardized achievement tests. Therefore, over time, the use of an adequate classroom observation instrument, along with the use of standardized achievement tests, should make it possible to answer a variety of questions in a new way--by using already obtained natural observations. This has the advantage of allowing us to test hypotheses using an existing natural universe of data rather than setting up an experiment (experimental bias is hard to avoid), or going out to observe a single set of factors (confounding influences are hard to avoid).

The kinds of questions that can be answered in this way include:

- Is the effect of instruction greater or less than the effect of initial ability on entering school, or on entering a particular grade?

- Can specific teacher actions, or teacher behaviors, or teacher-initiated events be identified with higher (or lower) achievement test scores?
- Are some instructional models better than others for low-SES urban children? For children whose ethnic background is Hispanic?

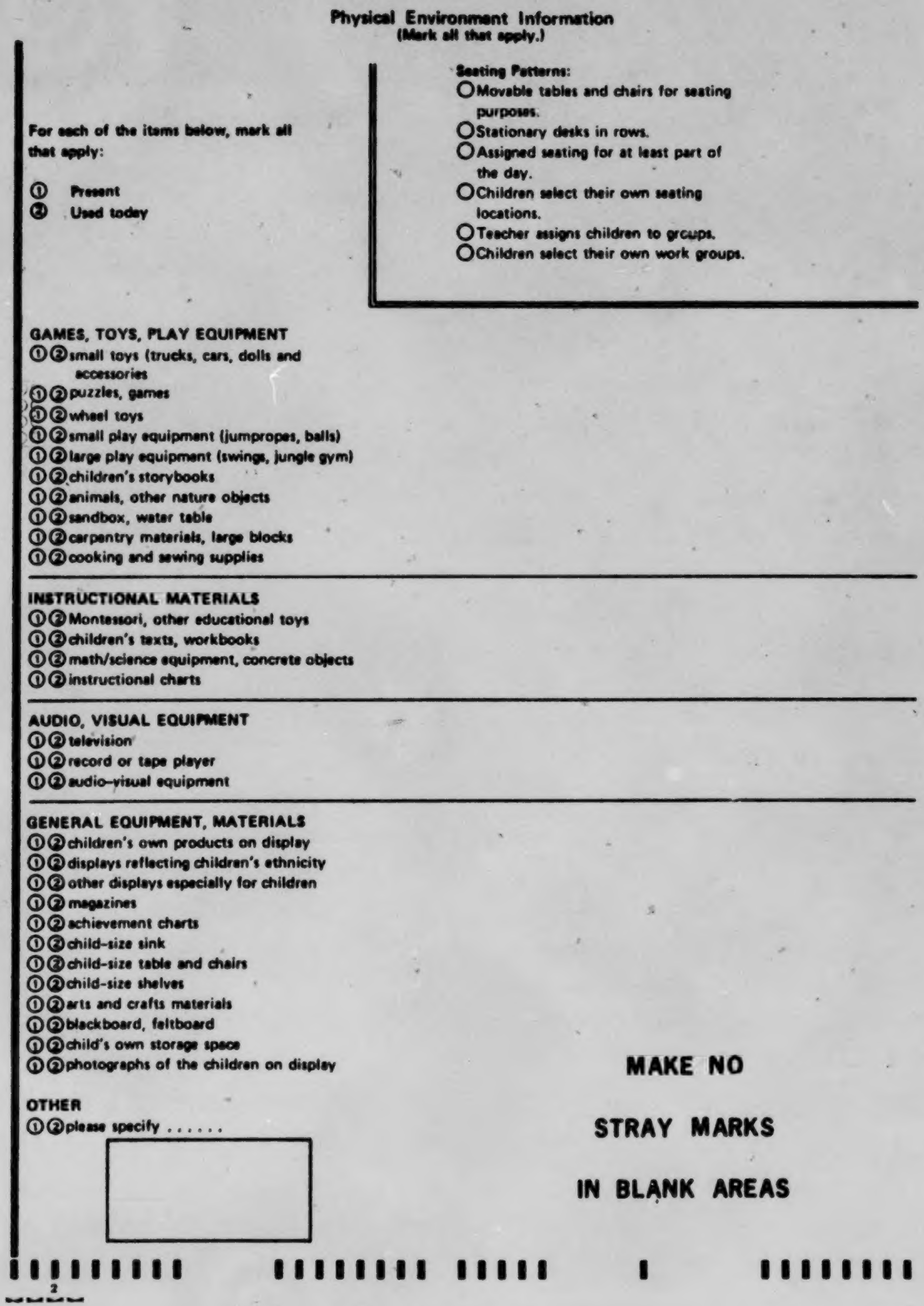
Classroom Observation

Determining what goes on in a classroom is not easy; the physical environment is complex, and there are both actors and events to record. The process is at least as difficult as proper archeological fieldwork, with the added complication that it takes place as it occurs. Although a number of observation systems has been developed, most of them collect data on singular events, not on the total environment and occurrences in the classroom. To observe and record the gestalt of the classroom, therefore, was (and remains) a significant challenge.

The classroom observation instrument. The observation system used at SRI International was developed in response to a request by the U.S. Office of Education in 1969 to evaluate the implementation of the models of education found in Follow Through Planned Variation. These models vary from highly structured, teacher directed models to flexible open-education models. Of interest to the government was whether or not the specifications of each model were being followed: Whether the correct materials were being provided and used; whether specified activities of children, teachers, and aides were occurring with the specified frequency; and whether the interaction patterns of all the participants followed sponsor guidelines. This type of systematic documentation required a comprehensive observation system. As we studied the available systems, it became clear that, while one system documented interactions and another listed materials or child behaviors, no existing system provided a complete picture of the classroom, or showed how all of the variables interact. Therefore, with the assistance of Follow Through representatives, we developed our own system.

A record of the physical environment was developed from a list of descriptors each Follow Through model sponsor prepared of the materials that should be used in the classroom. This long list indicated whether specific materials were present and used (see Figure 3).

The instrument developed to record classroom activities was more complicated. Not only did we want to know what activities occurred throughout the day, we also wanted to know what activities occurred together. Some models indicated that reading, math, and art should be scheduled for specific periods during the day; other models indicated that reading, math, and art should occur simultaneously, with groups of children engaged in the different activities. Also of interest was which adult was working with the children in the activities, or whether the children were working independently. To capture this type of information, we developed a grid that listed all the possible classroom activities (see Figure 4) and the possible grouping arrangements. This allowed us to examine who the teacher and aides worked with and in what activities. Questions like, Does the teacher or aide work with one child, two children, small groups, or large groups in reading, math or art? could be answered. Also, we could compute the average frequency with which students were involved in reading or any other activity throughout the day. We have come to call this grid "The Snapshot," since it provides a still picture of everyone in the classroom. The grid was filled out 4 times an hour, 5 hours a day, for 3 days, for a total of 60 Snapshots for each classroom. A very good description of what goes on, showing teacher, aide, and child activities is provided. Also, the activities of Day 1 can be compared with the activities of Day 2 and Day 3.



Physical Environment Information
(Mark all that apply.)

For each of the items below, mark all that apply:

① Present
② Used today

Seating Patterns:

- ○ Movable tables and chairs for seating purposes.
- ○ Stationary desks in rows.
- ○ Assigned seating for at least part of the day.
- ○ Children select their own seating locations.
- ○ Teacher assigns children to groups.
- ○ Children select their own work groups.

GAMES, TOYS, PLAY EQUIPMENT

- ①② small toys (trucks, cars, dolls and accessories
- ①② puzzles, games
- ①② wheel toys
- ①② small play equipment (jumpropes, balls)
- ①② large play equipment (swings, jungle gym)
- ①② children's storybooks
- ①② animals, other nature objects
- ①② sandbox, water table
- ①② carpentry materials, large blocks
- ①② cooking and sewing supplies

INSTRUCTIONAL MATERIALS

- ①② Montessori, other educational toys
- ①② children's texts, workbooks
- ①② math/science equipment, concrete objects
- ①② instructional charts

AUDIO, VISUAL EQUIPMENT

- ①② television
- ①② record or tape player
- ①② audio-visual equipment

GENERAL EQUIPMENT, MATERIALS

- ①② children's own products on display
- ①② displays reflecting children's ethnicity
- ①② other displays especially for children
- ①② magazines
- ①② achievement charts
- ①② child-size sink
- ①② child-size table and chairs
- ①② child-size shelves
- ①② arts and crafts materials
- ①② blackboard, feltboard
- ①② child's own storage space
- ①② photographs of the children on display

OTHER

- ①② please specify . . . . . .

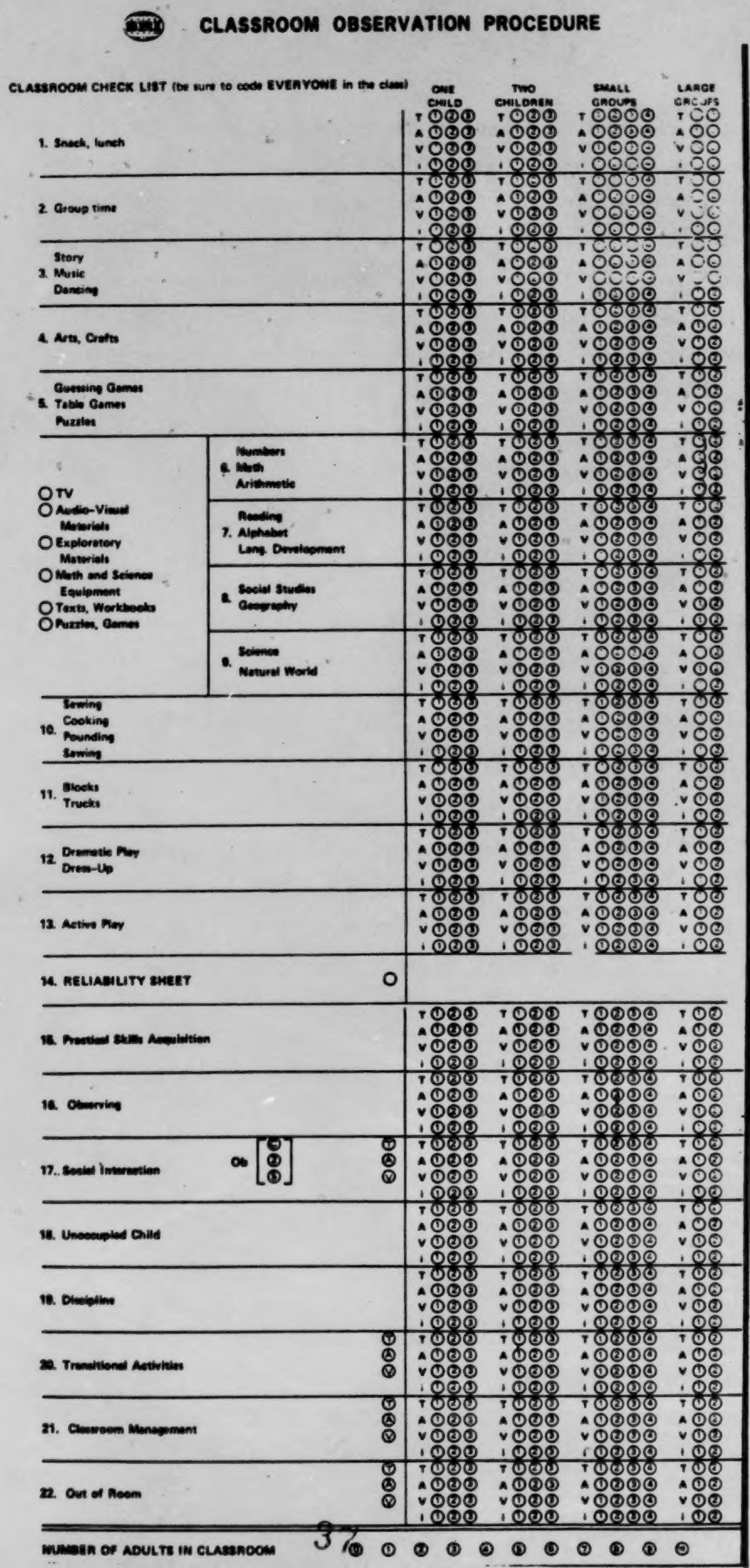
MAKE NO

STRAY MARKS

IN BLANK AREAS

2

Figure 3. Physical environment.



CLASSROOM OBSERVATION PROCEDURE

CLASSROOM CHECK LIST (be sure to code EVERYONE in the class)

		ONE CHILD	TWO CHILDREN	SMALL GROUPS	LARGE GROUPS
1. Snack, lunch		T ①②③ A ①②③ V ①②③ I ①②③	T ①②③ A ①②③ V ①②③ I ①②③	T ①②③④ A ①②③④ V ①②③④ I ①②③④	T ①② A ①② V ①② I ①②
2. Group time		T ①②③ A ①②③ V ①②③ I ①②③	T ①②③ A ①②③ V ①②③ I ①②③	T ①②③④ A ①②③④ V ①②③④ I ①②③④	T ①② A ①② V ①② I ①②
3. Story Music Dancing		T ①②③ A ①②③ V ①②③ I ①②③	T ①②③ A ①②③ V ①②③ I ①②③	T ①②③④ A ①②③④ V ①②③④ I ①②③④	T ①② A ①② V ①② I ①②
4. Arts, Crafts		T ①②③ A ①②③ V ①②③ I ①②③	T ①②③ A ①②③ V ①②③ I ①②③	T ①②③④ A ①②③④ V ①②③④ I ①②③④	T ①② A ①② V ①② I ①②
5. Guessing Games Table Games Puzzles		T ①②③ A ①②③ V ①②③ I ①②③	T ①②③ A ①②③ V ①②③ I ①②③	T ①②③④ A ①②③④ V ①②③④ I ①②③④	T ①② A ①② V ①② I ①②
○ TV ○ Audio-Visual Materials ○ Exploratory Materials ○ Math and Science Equipment ○ Texts, Workbooks ○ Puzzles, Games	6. Numbers Math Arithmetic	T ①②③ A ①②③ V ①②③ I ①②③	T ①②③ A ①②③ V ①②③ I ①②③	T ①②③④ A ①②③④ V ①②③④ I ①②③④	T ①② A ①② V ①② I ①②
	7. Reading Alphabet Lang. Development	T ①②③ A ①②③ V ①②③ I ①②③	T ①②③ A ①②③ V ①②③ I ①②③	T ①②③④ A ①②③④ V ①②③④ I ①②③④	T ①② A ①② V ①② I ①②
	8. Social Studies Geography	T ①②③ A ①②③ V ①②③ I ①②③	T ①②③ A ①②③ V ①②③ I ①②③	T ①②③④ A ①②③④ V ①②③④ I ①②③④	T ①② A ①② V ①② I ①②
	9. Science Natural World	T ①②③ A ①②③ V ①②③ I ①②③	T ①②③ A ①②③ V ①②③ I ①②③	T ①②③④ A ①②③④ V ①②③④ I ①②③④	T ①② A ①② V ①② I ①②
10. Sewing Cooking Pounding Sawing		T ①②③ A ①②③ V ①②③ I ①②③	T ①②③ A ①②③ V ①②③ I ①②③	T ①②③④ A ①②③④ V ①②③④ I ①②③④	T ①② A ①② V ①② I ①②
11. Blocks Trucks		T ①②③ A ①②③ V ①②③ I ①②③	T ①②③ A ①②③ V ①②③ I ①②③	T ①②③④ A ①②③④ V ①②③④ I ①②③④	T ①② A ①② V ①② I ①②
12. Dramatic Play Dress-Up		T ①②③ A ①②③ V ①②③ I ①②③	T ①②③ A ①②③ V ①②③ I ①②③	T ①②③④ A ①②③④ V ①②③④ I ①②③④	T ①② A ①② V ①② I ①②
13. Active Play		T ①②③ A ①②③ V ①②③ I ①②③	T ①②③ A ①②③ V ①②③ I ①②③	T ①②③④ A ①②③④ V ①②③④ I ①②③④	T ①② A ①② V ①② I ①②
14. RELIABILITY SHEET	○				
15. Practical Skills Acquisition		T ①②③ A ①②③ V ①②③ I ①②③	T ①②③ A ①②③ V ①②③ I ①②③	T ①②③④ A ①②③④ V ①②③④ I ①②③④	T ①② A ①② V ①② I ①②
16. Observing		T ①②③ A ①②③ V ①②③ I ①②③	T ①②③ A ①②③ V ①②③ I ①②③	T ①②③④ A ①②③④ V ①②③④ I ①②③④	T ①② A ①② V ①② I ①②
17. Social Interaction	Ob [①②③] Ⓣ Ⓐ Ⓥ	T ①②③ A ①②③ V ①②③ I ①②③	T ①②③ A ①②③ V ①②③ I ①②③	T ①②③④ A ①②③④ V ①②③④ I ①②③④	T ①② A ①② V ①② I ①②
18. Unoccupied Child		T ①②③ A ①②③ V ①②③ I ①②③	T ①②③ A ①②③ V ①②③ I ①②③	T ①②③④ A ①②③④ V ①②③④ I ①②③④	T ①② A ①② V ①② I ①②
19. Discipline		T ①②③ A ①②③ V ①②③ I ①②③	T ①②③ A ①②③ V ①②③ I ①②③	T ①②③④ A ①②③④ V ①②③④ I ①②③④	T ①② A ①② V ①② I ①②
20. Transitional Activities	Ⓣ Ⓐ Ⓥ	T ①②③ A ①②③ V ①②③ I ①②③	T ①②③ A ①②③ V ①②③ I ①②③	T ①②③④ A ①②③④ V ①②③④ I ①②③④	T ①② A ①② V ①② I ①②
21. Classroom Management	Ⓣ Ⓐ Ⓥ	T ①②③ A ①②③ V ①②③ I ①②③	T ①②③ A ①②③ V ①②③ I ①②③	T ①②③④ A ①②③④ V ①②③④ I ①②③④	T ①② A ①② V ①② I ①②
22. Out of Room	Ⓣ Ⓐ Ⓥ	T ①②③ A ①②③ V ①②③ I ①②③	T ①②③ A ①②③ V ①②③ I ①②③	T ①②③④ A ①②③④ V ①②③④ I ①②③④	T ①② A ①② V ①② I ①②

NUMBER OF ADULTS IN CLASSROOM ⓪ ① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩

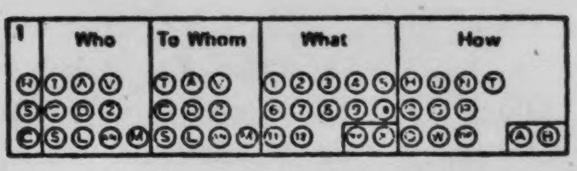
Figure 4. The Snapshot

Once we were able to describe the classroom stage and the scene, we wanted to document the interactions of teachers, aides, and children. The Flanders System provides a good model for recording these interactions. We were fortunate that Dr. Ned Flanders was at the Stanford University Center for Advanced Study in the Behavioral Sciences. He generously gave of his time and assisted us in structuring our interaction system. It still contains many of his codes, but also includes codes for nonverbal actions, movements, and many descriptors of the message (see Figure 5). The interactions of a teacher, an aide, or a child were recorded for a 5-minute period, 4 times an hour, 5 hours a day. For the 3 days of observation, 60 interaction observations were made for each classroom, in addition to the 60 Snapshots.

The physical environment checklist, the snapshot of activities and groupings, and the Five-Minute Interaction observation (FMI) together constitute a comprehensive observation system that describes the total classroom environment.

Before the first observation system was put into final form, the principal researcher tried it out in the classrooms of eight different educational models. At the same time, ethnographic recordings were made of the classrooms so that comparisons could be made between the written script and the coded data. Several important occurrences found only in the written script, such as nonverbal feedback through touching, were then incorporated into the coding system.

Fortunately, we had the opportunity to observe in the Follow Through classrooms over a period of 4 years. The observation system was modified over time. Each year, representatives of the Follow Through models were asked to critique the system and recommend changes that would more specifically describe their classrooms. By the fourth year, most activities and behaviors that could be seen or heard in classrooms could be recorded on this observation system. However, the more subtle objectives of educational models, like motivating children through intrinsic rewards, still cannot be recorded or quantified.



Who/To Whom

T - Teacher
A - Aide
V - Volunteer
C - Child
D - Different Child
2 - Two Children
S - Small Group (3-8)
L - Large Group (9 up)
An - Animal
M - Machine

What

1 - Command or Request
2 - Open-ended Question
3 - Response
4 - Instruction, Explanation
5 - Comments, Greetings; General Action
6 - Task-related Statement
7 - Acknowledge
8 - Praise
9 - Corrective Feedback
10 - No Response
11 - Waiting
12 - Observing, Listening
NV - Nonverbal
X - Movement

How

H - Happy
U - Unhappy
N - Negative
T - Touch
Q - Question
G - Guide/Reason
P - Punish
O - Object
W - Worth
DP - Dramatic Play/ Pretend
A - Academic
B - Behavior

R - Repeat the frame
S - Simultaneous action
C - Cancel the frame

Figure 5. List of codes for Five-Minute Interaction.

Can you Believe the Data?

Training. Proper use of the observation system required intensive observer training. Observer trainees were brought from their communities to a regional center for 7 days of training. Observers had already received home training packets and were expected to have memorized the code definitions before arriving at the sessions. We looked for trainees who had at least 2 years of college, who had some experience with young children, and who had no association with the Follow Through program.

During training, for the most part, we worked in small groups, trying to keep the ratio of trainees to trainer at a 5 to 1 ratio. We used many training techniques, including role playing, coding videotapes, coding natural classrooms, and homework assignments where the trainees wrote vignettes using the codes. At some time, each observer coded in the classroom with an SRI trainer. At the completion of training, to help decide whether the observers were competent to collect data, we gave a criterion videotape test which showed examples of all of the codes. Any observer who could not code each code with at least 70% reliability was not permitted to collect data.

Assessing reliability. Interrater agreement was assessed, first in classrooms using SRI trainers as the criterion, but then using videotapes. To see whether ability improved or deteriorated, the videotape was administered 2 weeks after training and data gathering had started. In the 7 years of our experience in training observers, we have always found that most observers gain rather than lose in their ability to code if they continue to use the system. Observers who coded a particular code incorrectly on the videotape also tended to disagree with the SRI trainer when coding together in the classroom. We have primarily used the criterion videotapes to judge quality of observer coding, since this method is less expensive and ensures examining a wide range of codes.

Validity. The validity of the instrument has been examined in several ways. The operational definitions are very straightforward: To code "positive affect," an observer must see a broad smile or hear laughter; to code punishment, the observer must see the teacher restrain or touch a child and/or hear the teacher withhold some privilege. The code name reflects a concept whose implementation can be seen or heard. (See the operational definitions in Stallings and Kaskowitz, 1974.)

Cross-validity checks have been made, comparing data from the Snapshot instrument with the data from the Five-Minute Interaction instrument. For example, the proportion of time for teachers working with one child recorded on the Snapshot is similar to the proportion of time teachers speak to small groups on the FMI observation, and these variables also show a similar correlation with outcome scores.

Another indicator of validity is that, using the observation data, 72% of 271 Follow Through classrooms were correctly identified as to sponsor model.

Applying the Instrument in Classroom Studies

Follow Through planned variations. SRI International was funded by the U.S. Office of Education to evaluate the implementation of the National Planned Variation Follow Through Program, in which 22 sponsors had attempted to implement different educational models in 154 Follow Through projects located in 136 rural and urban communities throughout the country. It was in order to assess whether or not planned variation existed in the classroom that the classroom observation instrument was developed, and it was because the instrument was successful in assessing the implementation of a particular educational model in the classroom that, in 1973, the Office of Education funded SRI to study implementation in 108 first grade classrooms and 58 third grade classrooms, over 7 different educational models.

Those models chosen represent a wide spectrum of innovative educational theories. The range includes two models based upon positive reinforcement theory (from the University of Kansas and the University of Oregon), a model based primarily upon the cognitive developmental theory of Jean Piaget (High/Scope Foundation), an open classroom model based upon the English Infant School theory (Education Development Center), and three other models drawn from Piaget, John Dewey, and the English Infant Schools (Far West Laboratory, University of Arizona, and the Bank Street College).

The data were collected in the spring of 1973 in 36 project locations. The sample represents approximately 20 first grade and 20 third grade classrooms for each of seven Follow Through sponsors, at five or more sites per sponsor (see Table 1). Program implementation in the classroom was judged on the basis of two criteria: (1) the extent to which a sponsor's classrooms are found to be uniform on selected implementation variables, and (2) the extent to which a sponsor's classrooms differ from the traditional Non-Follow Through classrooms on the same set of variables.

The results of the classroom observations were then subjected to partial correlations with standardized achievement tests (Wide Range Achievement Test, or WRAT, given upon entrance to school; the Metropolitan Achievement Test sections on reading and math, given in both first and third grades; and the Raven's Coloured Progressive Matrices tests of problem-solving skills given in third grade only). In addition, stepwise regressions were computed using selected observed process variables and all child outcomes; the WRAT entered the regression equation first.

It is potentially true, as Barak Rosenshine (1977) notes, that when a great many variables are subjected to partial correlations, "many significant correlations /are/ obtained by chance." However, it is also true that as the number of classrooms increases, the possibility that chance will account for any particular finding decreases. In studying the Follow Through planned variations, out of a possible 340 correlations between reading achievement and classroom processes, 118 were significantly related with a probability of only 0.05 that the result could have occurred by chance. Out of a possible 340 correlations between math achievement and classroom processes, 108 were significantly related with a probability of no more than 0.05 that the result could have occurred by chance.

Stepwise regressions showed that more behavioral outcomes were explained by instructional procedures than by entering aptitude, that more of the absence rate (an indication of comfort in the classroom) was explained by instructional procedures than by entering aptitude, and that more of the test score variance in math is explained by instructional process variables than by entering ability. In reading, instructional procedures account for 37% of the test score differences--not more than half, but still a significant amount.

Therefore, when we say that what occurs within a classroom does contribute to achievement in basic skills, good attendence, and desired child behaviors, we feel there is sound evidence for believing it. When we say that some processes appear to lead to higher achievement than other processes, we feel that there is reasonably good evidence for believing each of those relationships, but that the evidence would be improved by confirmation from further studies. This study is discussed in detail in section IV.

California Early Childhood observation evaluation. In the spring of 1977, the California State Department of Education requested SRI to examine a set of schools in the Early Childhood Education program that had scored in the lowest 20th percentile in reading tests, to see what distinguished schools where scores increased from schools where scores decreased. A total of 45 third grade classrooms were observed, using the classroom observation instrument. These classrooms, of which 20 were in "increaser" schools, and 25 in "decreaser" schools, were observed using the same instrument used in the Follow Through evaluations. The observations were then examined both by school ("increaser" and "decreaser") and by classroom ("gain" and "no-gain").

Analysis of variance indicated that the processes used more often in increaser schools in general were not similar to those used in successful Follow Through classrooms. Rather, we found that successful classrooms existed in both increaser and decreaser schools. Teachers in these successful classrooms did perform very similarly to the successful teachers in Follow Through, adding to the growing body of evidence. The project is discussed in section V.

Teaching basic reading skills in secondary schools. SRI was funded by NIE to conduct a two-phase study of teaching basic reading skills in secondary schools. To carry out this study, SRI modified the Classroom Observation Instrument and developed a Secondary Observation Instrument that provides the same kinds of information about the gestalt of the secondary classroom as SRI's Classroom Observation Instrument does about the primary grades. A total of 43 classes (27 junior high and 16 senior high) were observed, with a total of 905 students. In addition, two student rating scales were used to further describe classroom process, and they turned out to be reliable when what students said was compared with the classroom observations. From the findings in Phase II, an experimental design was carried out using a matched sample of trained and untrained teachers. The study is discussed in section VI.

Other Studies. SRI has been funded by the National Institute of Education to explore the reasons women do or do not go into higher mathematics classes in high school. Part of the study will include the use of the classroom observation instrument, in the version developed for secondary schools in mathematic classrooms in selected high schools. The study, which is still in the initial stages, is described in section VII; it is expected to provide evidence that will add to the growing body of information about how teaching practices and teacher behaviors affect scholastic outcomes.

Studies by others that suggest some new areas where research using classroom observation could be useful are also discussed in section VII.

IV. FOLLOW THROUGH PLANNED VARIATION OBSERVATION EVALUATION

The Follow Through program began in 1967 when researchers and other educational stateholders were invited by the Office of Economic Opportunity to submit plans for establishing their various teaching models in public schools in order to test whether their individual approaches could improve the educational achievement of economically disadvantaged children. From the group that came forward, 22 eventually were selected to implement their programs as Follow Through program sponsors. Although they varied somewhat from year to year, ultimately sponsor models were implemented in 154 Follow Through projects within 136 urban and rural communities in all regions of the country.

The theory and practices proposed by the various educational sponsors were quite diverse, and from the inception of the program in 1969, government agencies and educators have been asking, Does planned variation exist? and, if so, How do the planned educational programs affect children? For any planned intervention in education, there is little reason to evaluate the outcomes until it is clear that the intervention took place as planned.

The purpose of the SRI observation study of classrooms was to assess whether or not planned variation exists. Four Follow Through observation studies were funded from 1969 to 1973. The first three studies were limited to one or two sites per sponsor, and few generalizations could be made regarding the sponsor's performance at other sites. Realizing that a study of greater scope was needed in order to assess a sponsor's ability to implement the model in sites with different characteristics, the Office of Education commissioned a comprehensive study of seven models (Table 1).

Implementation

A list of variables observable using the COI was selected for each of the seven models. The list of critical variables describes any sponsor's model only in part, and there is considerable overlap in the critical variables of the different models (see Table 2). Some of the important subtle processes of the programs, such as developing intrinsic motivation or concepts of time and space, have not been assessed; nonetheless, the list worked.

Since the Follow Through programs are intended to be innovative and to represent alternatives to the conventional classroom, a pool on Non-Follow Through classrooms was used as the standard from which Follow Through classrooms were expected to differ in specified ways. The standards were established separately for first and third grades.

For each sponsor's classroom, an implementation score was computed for each variable of each sponsor. Table 3 illustrates the computation for one variable, Wide Variety of Activities, for one sponsor (Far West Laboratory).

To measure how well each Follow Through sponsor's model is implemented in the classrooms, a total implementation score was computed for each Non-Follow Through classroom on each sponsor's set of implementation variables. The mean and standard deviation of the Non-Follow Through (NFT) pooled classrooms were reported for each sponsor. Significance tests were made separately for first and third grades to show the differences between each Follow Through sponsor's classrooms and the Non-Follow Through classrooms.

Table 1

CLASSROOM OBSERVATION SAMPLE, SPRING 1973

Sponsor and Sites	Number of Follow Through Classes Observed	
	First Grade	Third Grade
Far West Laboratory for Educational R&D		
0201 Berkeley, Calif.*	4	4
0204 Duluth, Minn.*	4	4
0207 Lebanon, N.H.	4	4
0209 Salt Lake City, Utah	4	4
0213 Tacoma, Wash.	4	4
University of Arizona		
0305 Des Moines, Iowa	4	4
0307 Fort Worth, Texas*	4	4
0308 LaFayette, Ga.	3	4
0309 Lakewood, N.J.	4	4
0311 Newark, N.J.	4	4
0316 Lincoln, Nebraska	4	4
Bank Street College		
0502 Brattleboro, Vermont	3	3
0504 Fall River, Mass.	4	4
0506 New York City, P.S. 243K	4	4
0508 Philadelphia II, Pa.*	4	4
0510 Tuskegee, Ala.*	4	4
University of Oregon		
0703 E. St. Louis, Ill.	4	4
0707 New York City, P.S. 137K	3	3
0708 Racine, Wisc.	4	4
0711 Tupelo, Miss.*	4	4
0719 Providence, R.I.	4	4
University of Kansas		
0801 New York City, P.S. 77X*	2	2
0803 Philadelphia VI, Pa.*	4	4
0804 Portageville, Mo.*	4	3
0806 Kansas City, Mo.	4	4
0807 Louisville, Ky.	4	4
High Scope Educational Research Foundation		
0901 Greenwood, Miss.*	4	4
0902 Ft. Walton Beach, Fla.*	4	4
0903 New York City, P.S. 92M	3	4
0906 Greeley, Colo.	3	3
0907 Denver, Colo.	4	4
Education Development Center		
1101 Burlington, Vermont	4	4
1103 Philadelphia IV, Pa.*	4	4
1106 Paterson, N.J.*	4	4
1107 Rosebud, Texas	3	3
1108 Smithfield, N.C.	4	2
Total	136	135

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[*] These sites have been observed previously.

Table 2

LIST OF CRITICAL VARIABLES SELECTED BY SPONSORS

Variables No.	Variables Description	Far West Labs	University of Arizona	Bank Street	University of Oregon	University of Kansas	High Scope	EDC
24	Child selection of seating and work groups	X	X	X			X	X
25	Games, toys, play equipment present	X	X	X			X	X
39	General equipment, materials present	X				X		X
65	Guessing games, table games, puzzles		X			X	X	
66	Numbers, math, arithmetic	X	X	X	X	X	X	X*
67	Reading, alphabet, language development	X	X	X	X	X	X	X*
70	Sewing, cooking, pounding		X				X	
71	Blocks, trucks						X	
74	Practical skills acquisition	X**		X				
83	Wide variety of activities, over one day	X	X	X			X	X
86	Teacher with one child	X	X	X			X	
87	Teacher with two children			X				
88	Teacher with small group		X	X	X	X	X	
92	Aide with one child	X		X				
94	Aide with small group		X		X	X	X	
114	One child independent	X	X	X				X
115	Two children independent							X
116	Small group of children independent	X		X				X
239	Math or science equipment/Academic Activities	X		X			X	X
240	Texts, workbooks/Academic Activities				X	X		
343	Child to adult, all verbal except response			X				
344	Individual child verbal interactions with adult	X	X	X	X	X	X	X
350	Child questions to adults	X	X	X			X	X
363	Child group response to adult academic commands/requests or direct questions				X			
372	Child presenting information to a group			X			X	
375	Adult instructs an individual child	X						X
376	Adult instructs a group				X			
390	Adult task-related comments to children						X	X
394	All adult acknowledgment to children	X		X	X	X	X	
398	All adult praise to children		X		X	X		
412	Adult feedback to child response to adult academic commands/requests, questions				X	X		
420	Adults attentive to a small group	X			X		X	
421	Adults attentive to individual children	X	X	X		X	X	
423	Positive behavior, adults to children	X	X	X				
435	Total academic verbal interactions				X			
438	Adult communication or attention focus, one child	X		X		X	X	X
440	Adult communication or attention focus, small group				X		X	
444	Adult movement	X						
450	All child open-ended questions							X
451	Adult academic commands/requests and direct questions to children				X	X		
452	Adult open-ended questions to children	X	X	X			X	X
453	Adult response to child's question with a question						X	X
454	Child's extended response to questions		X	X				
456	All child task-related comments	X	X				X	
457	All adult positive corrective feedback	X			X	X		
460	All child positive affect	X	X					X
469	All adult reinforcement with tokens					X		
509	Child self-instruction, academic				X*			
510	Child self-instruction, objects			X			X	X
513	Child task persistence			X		X	X	
514	Two children working together, using concrete objects						X	
515	Small group working together, using concrete objects			X			X	
516	Social interaction among children	X		X				X
574	Child movement	X						X
599	Child self-instruction, nonacademic	X	X				X	
	Total number of Critical Variables	28** 27*	21	27	16** 17*	17	29	20** 22*

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*Third grade only.

**First grade only.

Table 3

WIDE VARIETY OF ACTIVITIES, OVER ONE DAY (Variable 83)

	First Grade Classrooms with Implementation Scores of					Third Grade Classrooms with Implementation Scores of				
Sites	Poor	Fair	Good	Very Good	Exc.	Poor	Fair	Good	Very Good	Exc.
Berkeley, Calif.					4*				1	3
Duluth, Minn.				3	1				1	3
Lebanon, N.H.					4					4
Salt Lake City, Utah					4			1	1	2
Tacoma, Wash.					4			2	1	1
Total Classrooms				3	17			3	4	13
Percent of classrooms				15%	85%			15%	20%	65%

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[*] Numerals indicate that 4 first grade classrooms obtained a score of excellent.

Table 4

TOTAL IMPLEMENTATION SCORES FOR CLASSROOMS BY SITE--UNIVERSITY OF KANSAS

Sites		First Grade					
		Classroom Scores				Site Scores	
		1	2	3	4	$\bar{X}$	S.D.
NYC P.S. 77X	(EK)	75.0%	81.3%	%	%	78.1%	4.4
Philadelphia VI	(EK)	78.8	90.6	82.4	88.2	85.0	5.4
Portageville	(EK)	96.5	91.8	90.6	88.2	91.8	3.5
Kansas City	(EK)	82.4	74.1	83.5	64.7	76.2	8.7
Louisville	(EK)	85.9	90.6	92.9	85.9	88.8	3.5
Sponsor Scores (N=18):						84.6%	7.9
NFT Scores (N=35):						62.4	8.5

t = 9.22

p < .001

f = 5.14

p < .01

Sites		Third Grade					
		Classroom Scores				Site Scores	
		1	2	3	4	$\bar{X}$	S.D.
NYC P.S. 77X	(EK)	71.2%	85.0%	%	%	78.1%	9.7
Philadelphia VI	(EK)	76.5	82.4	75.3	84.7	79.7	4.5
Portageville	(EK)	89.4	74.1	78.8		80.8	7.8
Kansas City	(EK)	88.2	88.2	84.7	84.7	86.5	2.0
Louisville	(EK)	88.2	91.8	87.1	85.9	88.2	2.5
Sponsor Scores (N=17):						83.3%	6.0
NFT Scores (N=36):						61.3	9.3

t = 8.89

p < .001

f = 2.53

p < NS

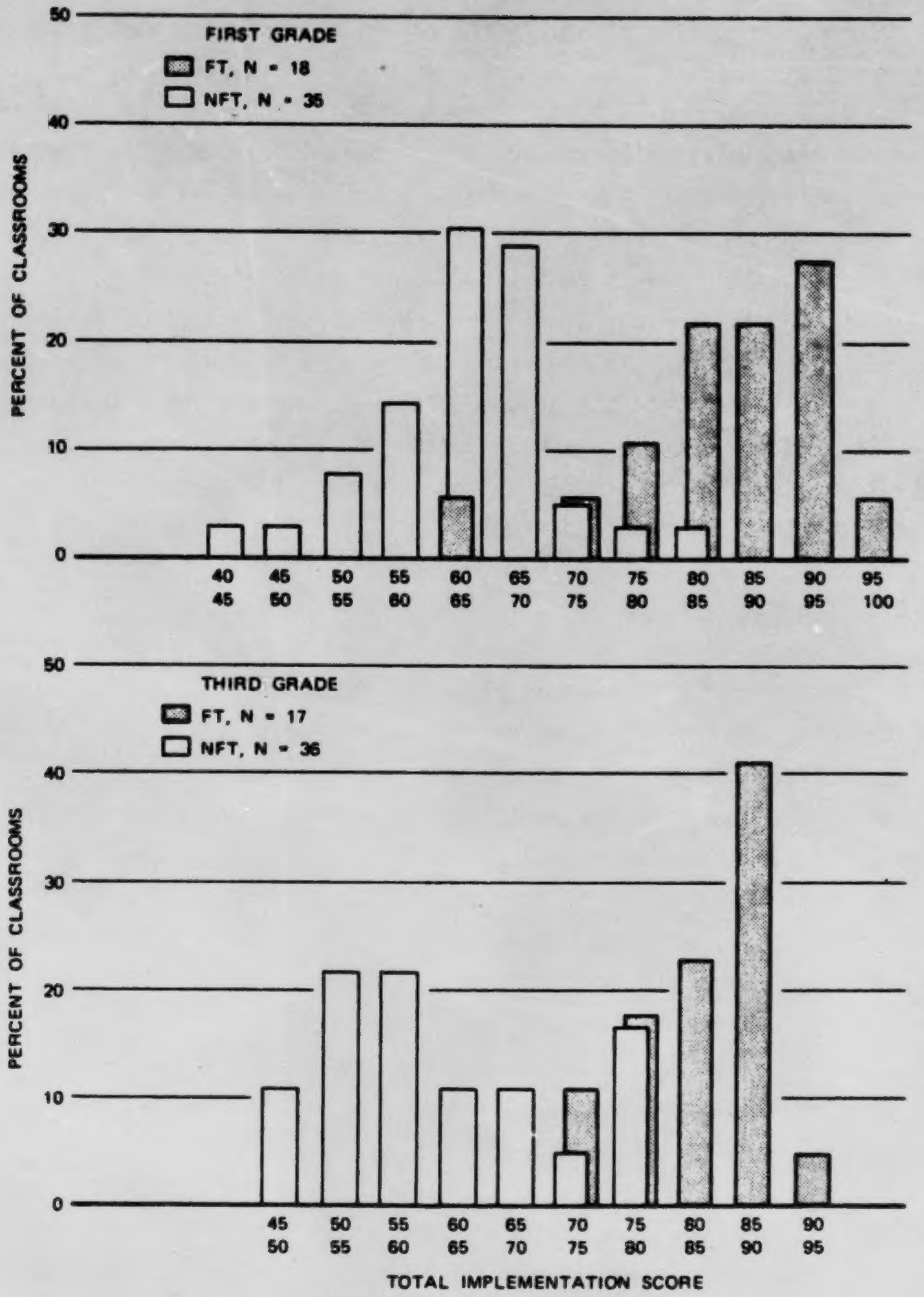

Figure 6. Histogram showing implementation scores for University of Kansas.

All seven of the sponsors' implementation mean scores for both grade levels differed significantly from the means of the Non-Follow Through classrooms. For the most part, the 20 first grades and 20 third grades of each sponsor appeared remarkably similar regardless of the site. Table 4 illustrates how similar the University of Kansas implementation scores were, whether they were in New York City or Portageville, Mo., and how much lower the NFT score was. Figure 6 illustrates that there is little overlap between the University of Kansas classrooms and the NFT classrooms. Some sponsors had implementation scores in a few classrooms as low as (or in one case lower than) Non-Follow Through classrooms. However, considering the diverse locations and the enormous task of making educational theory come alive consistently in the classrooms, we conclude that the seven models have been implemented to a remarkable degree.

Big-City Schools

Of the Follow Through classrooms observed, 89 were in big cities (New York, Philadelphia, Des Moines, Fort Worth, Newark, and Kansas City). In these cities the sponsors encountered all of the difficulties imaginable in trying to bring about educational change (difficult in any location). Sponsors had to gain the confidence of school officials, parents, and teachers. They had to provide training on how to structure classrooms, what materials and curriculum to use, and how to interact with children. In large cities the problems were compounded by the layers of administration that had to be traversed to get proper approval, by teacher union restrictions, and by commuting distance for teachers, which limited how long they were willing to stay for inservice workshops or how often they were willing to return to school for inservice training.

The data on Table 5 are separated by sponsor so that the total number of classrooms where implementation of an educational model was inadequate (below 70%) might be contrasted with the number of big city classrooms

Table 5

PERCENTAGE OF CLASSROOMS WITH IMPLEMENTATION SCORES BELOW 70% BY SPONSOR AND BY LOCATION IN A BIG CITY

	All Classes		Big City Classes	
Sponsor	Number	Percent with Score Below 70%	Number	Percent with Score Below 70%
Far West Laboratory for Educational R&D	40	0	0	0
University of Arizona	47	32%	24	53%
Bank Street College	38	34	16	38
University of Oregon	38	16	6	33
University of Kansas	35	3	28	4
High Scope Educational Research Foundation	37	16	7	71
Education Development Center	36	19	8	50
Total	271		89	
Average		17%		35%

scoring below 70%. Of the 271 sponsored first and third grade classrooms, 17% have implementation scores under 70%. Of the 89 classrooms in big-city schools, 35% received scores under 70%--in approximately 1 out of 3 classrooms in the big cities, the model was not well implemented.

The models of two sponsors, each having more than 20 classrooms in big cities, can be compared for their success in delivering their model in this setting. In Table 5 we find that University of Arizona has 24 classrooms in big cities and over half of those received implementation scores below 70%. The model of the University of Arizona is based upon individual developmental theory rather than behavior modification theory and is aligned with open education. Teachers in the University of Arizona model attempt to teach social skills of cooperation, planning, and problem-solving as well as basic skills.

An important component of the model is the use in reading and writing of practical examples from the child's home and school environment. The classrooms are organized around a variety of behavioral settings and learning centers. Children are allowed to make choices regarding their activities and seating arrangements. Small groups of children are able to learn from each other and are given individual attention from adults. Teachers are expected to be models of desired behavior. The University of Arizona believes that the child's acquisition of language and other skills is affected by such modeling on the part of adults. Children are encouraged to ask questions and adults to respond with liberal quantities of praise, support, attention, and affection. Every effort is made to ensure that the child will come to regard school as significant, desirable, and rewarding.

The goals of this model are certainly laudable, but data from Table 5 indicate that although the model is very difficult to implement overall, it is especially difficult to implement in large cities. Two other models with fewer classes, in big-city schools High/Scope and EDC, are individual developmentally oriented and use strategies similar to the University of Arizona to deliver their program. These two models were also hard to implement in the big-city schools (71% and 50% respectively with implementation scores below 70%).

The behavior changes in teachers and students that these models seek are subtle and difficult to specify clearly. In some cases, teachers are instructed to set up situations where children can inquire and learn from their interactions with materials and people. Learning to ask open-ended, thought-provoking questions and to listen rather than lecture requires a basic change for some teachers, and models requiring basic changes take longer to implement. (Over the 4 years of our observation, the implementation did improve.) Also, first grades were consistently better implemented than third grades in the 1973 data, because first grades were implemented in 1969 and 1970 while implementation at third grade did not start until later.

Unlike the more open classroom models, the University of Kansas, which had 28 classrooms in big-city schools, had only one classroom where implementation was found to be inadequate (below 70%), a first grade in a big-city school. This model is based upon behavior modification theory and is very specific in what it requires the teacher to do.

The University of Kansas Behavior Analysis Approach aims at teaching children basic skills by means of systematic positive reinforcement of desired behavior. The model uses a token to provide an immediate reward to the child for successfully completing a learning task. Earned tokens can be "spent" later for special activities, such as participation in a spelling bee or a game of musical chairs, work on a puzzle, or play with blocks and trucks.

Instruction (work time) and special activity (spend time) alternate throughout the day, and the amount of time spent on instruction increases as the amount of reinforcement needed to sustain motivation decreases. More tokens are given when a child is beginning to learn a task and fewer as the child becomes more skillful. Also, fewer tokens are given as the child progresses through the grades.

The program emphasizes individualized instruction based on sequenced learning materials. The curriculum materials include a description of the behavior a child should be capable of at the end of a learning sequence, and provide clear criteria for judging a correct response. Small groups formed for reading instruction are directed by the teacher. A full-time trained aide provides math instruction, and spelling and handwriting are taught by another aide. Individual tutoring is provided by parent aides. Although children in this model are in small groups, they receive adult attention on a one-to-one basis.

The curriculum materials also provide for periodic testing and monitoring of achievement gains. A system of careful record keeping allows the teacher to keep a close watch on each child's progress and to tailor the curriculum to each child's needs.

The other model based upon behavior modification (University of Oregon) had only six classrooms in big-city schools, and two of the six had implementation scores below 70%. The two behavior modification sponsors who had the greatest percentage of success in the big-city schools were very specific in stating what teachers should do. The teachers test the children weekly and send the tests to the sponsor for recording. The sponsor sends the teacher immediate feedback during the following week so that the teachers will know how to adjust the children's basic skills program.

Implementing the teacher-directed models in big urban schools seems less difficult than implementing the more open education models. Perhaps the extra stress sometimes found in large urban schools impaired the ability of teachers to implement the more open education models. Stress may make even relaxed people more directive and anxious, thus less able to carry out the model as specified. In Philadelphia, where there were two major teacher strikes in 1973, teachers in the open education models had become very directive in the classrooms.

This does not suggest that open education models should not be used in big cities; much of what they are trying to teach children is important for children to learn. It must be possible to implement the open education models in the big-city schools, because 65% of the classrooms studied were well implemented. The findings simply indicate that it is more difficult than implementing the more directive models.

Implementing the models in medium-sized cities, small cities, and towns was easier for all of the models. Out of the 64 classrooms in medium-sized cities, 82% received implementation scores of 70 or above and out of 82 classrooms in small cities or towns, 93% received implementation scores of 70 or above.

Classroom Processes and Child Outcomes

The study of implementation would be of little importance if we did not believe that differing educational theory and practices affect children differently.

Of the 136 first grade and 137 third grade classrooms observed, only 105 first grades and 58 third grades had baseline test scores and Spring 1973 test scores. Only these classrooms were included in the study of classroom processes and child outcomes. Table 6 indicates the number of classrooms per sponsor and for Non-Follow Through included in the study of process and outcome.

All sponsors' classrooms and Non-Follow Through classrooms observed (and which had sufficient baseline data) were merged in this part of the study. The analyses were not separated on the basis of city size, but most of the classrooms represented on Table 6 were in medium to large cities.

The entering ability of the children was assessed by the Wide Range Achievement Test (WRAT), administered to the children when they first entered school, either kindergarten or first grade. Reading and math skills were assessed by the Metropolitan Achievement Test (MAT) in both first and third grades.

Table 6

NUMBER OF CLASSROOMS AND LOCATIONS IN THE PARTIAL CORRELATION AND REGRESSION ANALYSIS BY SPONSOR AND GRADE LEVEL

	First Grade		Third Grade		Big City Classes	
Sponsor	Number of Classes	Number of Locations	Number of Classes	Number of Locations	First Grade	Third Grade
Non-Follow Through	24	24	13	13		
Direct Interaction Models:						
University of Oregon	5	2	4	1	3	3
University of Kansas	17	5	12	4	12	12
Open Education Models:						
Far West Laboratory	12	3	14	4	0	0
Bank Street	11	4	7	2	4	4
University of Arizona	14	4	2	1	6	2
High Scope	13	4	0	0	2	0
Educational Development Center	12	3	6	2	3	4

Problem-solving skills (perceptual) were assessed in third grade only, using the Raven's Coloured Progressive Matrices (Raven's). This test was designed by John C. Raven (1956) as a culture-fair test of nonverbal reasoning, or fluid problem-solving ability in visual perceptual tasks. The Intellectual Achievement Responsibility Scale (IAR), used in the third grade only, assessed the extent to which the child takes responsibility for his or her own successes or failures or attributes his or her achievements to the operation of external forces (e.g., luck or fate). Child behaviors were assessed through systematic observations recorded on the SRI Observation Instrument. The behaviors reported there are independence, task persistence, cooperation, and question asking. Absences were determined from school records.

Reading. The most strongly correlated variables suggest that the length of the school day and the average time a child spent engaged in a reading activity were related to higher reading scores in both first grade and third grade. When the school day is longer, children have more opportunity to engage in reading. The length of the school day for the classrooms in the evaluation varied among schools by as much as 2 hours. The trick, then, is to use the available school time for academic instruction. Harnischfeger and Wiley (1976) found that some Chicago classrooms spent 41% more time on basic skills instruction than other classrooms. Over the total school year, this amounted to 69 more days of instruction. Not surprisingly, students in these classrooms made more scholastic gain than students in classrooms with less time allocated to academic instruction.

It is essential to have enough time available for the slow-learning student to learn. Bloom (1976) says that the slowest 5% of the learners require five times as long to master a lesson as the faster students. He states that 99% of the students in school can master the work if given the appropriate amount of time and appropriate instruction.

Higher reading scores were obtained in classrooms using systematic instructional patterns where the teacher provides small bits of information and asks a question about this information. The child responds and the teacher immediately lets the child know whether the response is right or wrong. If he is wrong, the child is guided to the correct answer. If he is correct, he receives praise, a token, or some form of acknowledgment.

Positive reinforcement contributed to higher reading test scores in both first and third grades. Other researchers (Brophy, Good, & Nedler, 1975; Soar, 1973; and Brophy, Evertson, Crawford, & Sherman, 1975) also found that careful structuring or questions and feedback, i.e., drill and practice to a point of overlearning, was related to achievement. Brophy et al.'s findings were specific to low-and high-achieving students. They recommend that low-achieving students have questions asked so that they can answer correctly 80% of the time, and point out that it takes a sensitive instructional leader to help these children feel successful. High-achieving students need more challenge, and should not be drilled past the point where they can answer questions correctly 70% of the time.

Small groups were most effective for teaching first grade reading, while groups of nine or more were productive in the third grade. Soar (1973) reports a similar finding. In classrooms where children worked by themselves and kept at it, they also achieved higher reading scores. In classrooms where textbooks and programmed workbooks were used most often, the reading scores were higher.

The University of Oregon and the University of Kansas, both models that use direct instruction, showed greater gains in first grade reading than the other five sponsors did and greater gains than Non-Follow Through classes did. This was also true in Abt Associates' larger sample of classrooms reported in 1977 (Anderson et al., 1977). In the Abt report, models using direct instruction methods had students who made greater gain on reading achievement overall, and especially in the big cities of New York and Philadelphia.

Math. Out of a possible 340 correlations between math achievement and classroom processes, 108 were significantly related at the .05 level. The most strongly correlated variables suggest that, as in reading, the length of the school day and the average length of time each child spent in math activities were related to higher math scores in both first and third grades. Also, in classrooms where adults and children more often discussed or talked about mathematical problems and concepts, the test scores in math were higher. The value (in terms of math scores at the end of the third grade) of spending large amounts of class time on math was especially marked for the children whose numerical ability was weak when they entered school.

The effect of praise on achievement in math in first grade was variable: In classrooms where children had relatively low entering ability, the children profited more from a high rate of praise then they did in classrooms where the students had higher entering ability. This finding is in keeping with Brophy et al. (1975) findings regarding low-achieving students. This type of information could be useful in planning educational programs to enhance the learning of children with differing abilities at different age levels.

As in reading, children had higher math scores in classrooms where teachers more frequently used the systematic instructional patterns and positive reinforcement.

In classrooms where textbooks and programmed workbooks were used frequently, the test scores on math were especially high. In addition, the use of such instructional materials as programmed materials, Cuisenaire rods, or Montessori materials contributed to higher math scores. In Tom Good's study (1978) the teachers who helped students understand the math concepts clearly and used manipulative materials as necessary to teach the concept had students who gained more in math.

In first grade classrooms where children were taught in small groups, the math scores were higher. In third grade, large group instruction contributed to higher scores. When children could work by themselves some of the time and could persist at a task, they were also more likely to have higher scores in math achievement.

The University of Kansas, which used the classroom procedures described, had higher scores in first grade math than the other six sponsors and Non-Follow Through classes had. The University of Oregon, which also used these instructional processes in their classrooms, had higher scores in the third grade math than the other six sponsors and Non-Follow Through classes had. These findings strongly suggest that classroom procedures used in University of Kansas and University of Oregon classrooms contributed to child achievement in math.

Linda Meyers from the University of Oregon reports that in 1977, the students who were in their New York Follow Through direct instruction program from kindergarten through third grade:

- Perform at or near the national norm on standardized achievement tests of math and reading, and have continued to do so for 5 years.
- Significantly outperform control children on academic achievement measures.
- Are less likely to fall one or more years below grade level in all achievement areas (at Grade 3) than national norm groups.
- Sustain the gains they have made through fourth and fifth grades by continuing to perform at or above grade level and having scores significantly higher than control children in the same district.
- Have better attendance than the district as a whole at all grade levels.

Nonverbal problem solving. Out of a possible 340 correlations between the Raven's Problem Solving Test and classroom processes, 114 were significantly related at the .05 level. Of these, the most strongly correlated variables suggest that high scores on Raven's Coloured Progressive Matrices (a test of nonverbal perceptual problem solving) tended to be earned by children in the more flexible classrooms where a wide variety of materials are used, many different activities occur and children are allowed to select their own groups part of the time. In these more flexible classrooms children have more opportunities to manipulate materials and discover the relationships between items to see how things fit together. In these classrooms, adults interact with children on a one-to-one basis, more open-ended questions are asked, and children show more verbal initiative. Far West Laboratory, University of Arizona, Bank Street College, High/Scope Foundation, and Educational Development Center use these processes, and the classrooms in these models had higher scores on the Raven's than did the classrooms in the University of Kansas and University of Oregon models.

Locus of control. Out of a possible 340 correlations between the Intellectual Achievement Responsibility Scale and classroom processes, 106 were significantly related at the .05 level. Of these, the most strongly correlated variables suggest that children in the more open classrooms earned higher scores. Children from the more flexible classrooms took responsibility for their own success but not for their failure. Children from the more highly structured classrooms took responsibility for their own failure but attributed their success to their teacher's competence or other forces outside themselves. Only the classrooms of Educational Development Center had scores indicating that the children took responsibility for both their success and failure.

Absence rate. Days absent can be used as an indicator of attitude toward school. If children enjoy school, they may attend even if they do not feel well; if they do not like school, they are likely to stay home whenever they feel any discomfort.

Out of a possible 340 correlations between days absent and classroom processes, 102 were significantly related at the .05 level. Of these, the most strongly correlated variable suggest that in both first and third grade classrooms, children are absent less frequently in open classrooms--that is, in classrooms where there is a high rate of child independence, child questioning, adults responding, individualized instruction, and open-ended questioning. Also, in classrooms where children and adults smiled and laughed more often, the children were absent less often.

Children in both first and third grade were absent more frequently from classrooms where they worked in large groups more often and where adults used direct questions in academic work and frequent corrective feedback. Findings for the third grade indicate that in classrooms where children were punished they also were absent more often. In addition, classrooms with a higher rate of negative, harsh, or demeaning statements on the part of teachers and students showed a higher absence rate.

The findings in this report pertaining to absence rate indicate that at the first grade level, children in classrooms of sponsors who used more highly structured environments, materials, and interactions also had a higher absence rate. Classrooms of three sponsors--Far West Laboratory, University of Arizona, and High/Scope Foundation, models which used a wide variety of activities and material--had children who had lower absence rates than children in classrooms of other sponsors and Non-Follow Through classrooms. As might be expected, the absence rate for all sponsors and Non-Follow Through diminished from first grade to third grade.

Observed child behaviors. Like educators in general, Follow Through sponsors feel that the development of basic skills in reading and computing is important, but that it is also desirable for children to develop such attributes as task persistence, attending ability, cooperation, inquiry behavior, and independence. While these attributes appear to be elusive, we have been able to operationally define and systematically observe some of these behaviors. Partial correlations and stepwise regressions were computed to see how these outcomes for children were related to teaching processes.

Independence. In our study, independence is defined as a child or children engaged in a task without an adult. This type of independent behavior is more likely to be found in classrooms where teachers allow children to select their own seating and groups part of the time, where a wide variety of activities is available, and where an assortment of audiovisual and exploratory materials is available. The adults provide individual attention and make friendly comments to the children.

Our investigations indicate that children in the classrooms of Educational Development Center and Far West Laboratory showed more independence than did the children in Non-Follow Through and the other five sponsors' classrooms.

Task persistence. For this study, task persistence is defined as a child engaged in self-instruction over a few minutes or more. If the child begins to converse with someone during the task, the observer no longer codes task persistence. Task persistence occurred more often when textbooks and workbooks were used in the classroom. Where adults instructed one child at a time, the children were also likely to be more task persistent. This may be because young children often have difficulty with other children; if they can have a question answered or directions clarified, they can then go ahead independently with the task at hand.

The University of Arizona and the University of Kansas had higher scores in task persistence than the other five models and Non-Follow Through.

Cooperation. For this study, cooperation is defined as two or more children working together on a joint task. Cooperation is more likely in classrooms where a wide variety of activities occur throughout the day, where exploratory materials are available, and where children can choose their own groupings. If the adults interact with two children, asking questions and making comments about the task, the children seem to be encouraged to join each other in cooperative tasks.

The children in the Bank Street College, High/Scope Foundation, and Education Development Center programs more often joined each other in a cooperative task than did children in the other four models and Non-Follow Through children.

Question asking. In our study, we found that first grade children asked more questions where there was a one-to-one relationship of adult with child in classrooms, where adults responded to children's questions, and where adults made general conversational comments to children.

Children in classrooms using Far West Laboratory, Bank Street College, University of Kansas, High/Scope Foundation, and Educational Development Center programs ask questions more often than do children in the Non-Follow Through classrooms.

Results of Stepwise Regressions

Observed classroom procedure contributed as much to the explanation of test score differences as did the initial ability of children. Table 7 represents findings from a stepwise regression where the WRAT score was entered into the regression first. The third and seventh columns report that part of the variance explained uniquely by the process variable.

In both first and third grades, child behavioral outcomes were only slightly explained by entering aptitude. Very little of the absence rate was explained by entering ability, in either first or third grades. Approximately 50% of the variance was explained by the instructional procedures used in the classroom.

Table 7

SUMMARY STATISTICS FOR THE STEPWISE REGRESSION ANALYSES

Outcome Variable	First Grade (N=105) R^2_{WRAT}	First Grade (N=105) $R^2_{WRAT,}$ Process Variables	First Grade (N=105) Process Variables (Unique)	First Grade (N=105) Number of Process Variables (included in regression)†	Third Grade (N=58) R^2_{WRAT}	Third Grade (N=58) R^2_{WRAT} Process Variables	Third Grade (N=58) Process Variables (Unique)	Third Grade (N=58) Number of Process Variables (included in regression)*
Behavioral Outcome Variables								
Child Questions	.00	.28	.28	2	.00	.29	.29	3
Self-Esteem	.00	.48	.48	5	.01	.42	.41	6
Child Independence	.00	.67	.67	5	.01	.41	.40	3
Task Persistence	.00	.44	.44	9	.06	.61	.55	6
Cooperation	.00	.32	.32	2	.10	.61	.51	5
Verbal Initiative	.00	.22	.22	3	.00	.38	.38	2
Days Absent	.01	.67	.66	14	.07	.69	.62	6
Test Outcome Variables								
MAT Math	.32	.74	.42	10	.17	.81	.64	8
MAT Reading	.50	.73	.23	8	.42	.79	.37	7
Raven's	--	--	--	--	.41	.86	.45	9
IAR-Success	--	--	--	--	.18	.57	.39	4
IAR-Failure	--	--	--	--	.04	.83	.79	11

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*Wide Range Achievement Test was given to children in the sample when they entered Kindergarten.

†This column contains the number of process variables that entered the stepwise regression with an "F-to-enter" that was significant at .05.

More of the test score variance of children in math is explained by instructional process variables in first and third grades than by entering school ability. The amount of test score variance explained by the WRAT diminishes significantly from first to third grades. Most of the test score differences were accounted for by the amount of time spent in math activities, the amount of talk between teachers and students related to math, and a systematic form of questioning and providing feedback (praise and correction).

WRAT scores account for 50% of the differences in children's reading scores in first grades; this diminished to 42% in the third grade. The processes used by the teacher account for 37% of the test score differences in third grade reading, less in first grade.

The abilities required to function well on the Raven's test of nonverbal reasoning or perceptive problem solving have not been considered to be influenced by environment. We found that ability to perform well on the Raven's test was related to the classroom environment; our results suggest that children who for 3 years have been in classrooms that provide a wide variety of activities and variety of manipulative materials have learned to see the relationship between parts and wholes. Apparently, they understand spatial relationships similar to those tested on the Raven's.

Summary and Conclusions

A study of the instructional procedures used in classrooms and the achievement of children indicates that time spent in reading and math activities and a high rate of drill, practice, and praise contribute to higher reading and math scores. Children taught by these methods tend to accept responsibility for their failures but not for their successes. Lower absence rates and higher scores on a nonverbal problem-solving test of reasoning can be attributed in part to more open and flexible instructional approaches in which children are provided a wide variety of activities and materials and where children engage independently in activities and select their own groups part of the time.

Classroom instructional processes predicted as much or more of the outcome score variances than did the entering school test scores of children. Based upon these findings, we conclude that what occurs within a classroom does contribute to achievement in basic skills, good attendance, and desired child behaviors.

V. CALIFORNIA EARLY CHILDHOOD EDUCATION OBSERVATION EVALUATION

The purpose of the California Early Childhood Education (ECE) Program is to improve the education of children in classrooms from kindergarten through third grade. ECE focuses on the social, emotional, cognitive, and physical development of children. To promote the development of the whole child, the program specifies that school programs address the unique needs of each participating student. To facilitate meeting individual needs, classroom aides are provided and parent participation in the school is encouraged. ECE is expected to be beneficial to all students and families and school communities, but it is particularly directed toward low-achieving students.

Although regulations and guidelines are promulgated by the California State Department of Education, how the program is actually implemented is determined by the individual schools. Each school presents the State Department with a plan for implementation and the State Department staff monitors and reviews the school program to see whether or not the school is carrying out the plan.

Each year the California State Department of Education's Office of Program Evaluation and Research (OPER) has identified those schools that are more or less successful in improving the reading test scores of students at each grade level. The Office of Program Evaluation identified those schools which had entry-level test scores in the lowest 20th percentile of schools when they entered ECE in school year 1973-1974. School scores in spring 1976 indicated that in some schools, third grade reading scores were lower than when the school had entered the program, but other schools in the lowest 20th percentile had rising scores. In the spring of 1977 the State Department of Education's OPER commissioned SRI International to conduct a study of classrooms within these schools, to find out what is occurring in the schools with increasing scores (increaser schools) that distinguishes them from schools with decreasing scores (decreaser schools).

SRI observed and systematically recorded what was occurring in a sample of ECE classrooms selected from seven schools with increasing scores and seven schools with decreasing scores, all initially in the lowest 20th percentile of schools in the State Assessment Entry Level Tests. Within these schools, a total of 45 third grade classrooms were observed (20 increaser and 25 decreaser). Some increaser schools and some decreaser schools were in the same district, and 11 of the 14 schools were in urban settings. Table 8 presents the demographics of the two groups. The only difference between the two groups is that there are more limited and non-English speaking and bilingual students in the decreaser schools while the increaser schools have more low-income families.

Pre- and post-reading achievement test data were obtained from the California State Department of Education. This was student test scores on the California Assessment Program for spring 1976 and spring 1977.

We first compared the 20 classrooms within the increaser schools and the 25 classrooms in the decreaser schools. One-way analyses of variance were computed to compare the frequency of process variables used within one set of classrooms with the frequency of those processes used within the other set of classrooms. Statistical differences were found at the $p < .10$ level in 76 out of 360 variables and $p < .05$ level in 40 of the 360 variables.

The increaser schools had longer school days and the classrooms were a little more structured: The classrooms had more stationary desks in rows and assigned seating for students; they less often used toys, audiovisual materials, cooking and sewing equipment, or dramatic play.

Math and reading occurred with about the same frequency in both groups. Within those academic activities teachers in the increaser schools less frequently worked with only one or two students at a time in math or reading. Adults in classrooms of increaser schools less frequently worked with large groups of children and more often worked with small groups.

In the increaser schools, teachers were more often observed to be not involved with children, and children were observed to be working independently in reading, math, science, social studies, and art. Teachers in increaser schools more often were observed in social conversations and less often in instructional activities. More open-ended questions were asked in the increaser schools. The children were responsive and more often gave elaborated or extended responses. The adults in classrooms of increaser schools provided more acknowledgment to children but less corrective feedback. The children in classrooms of increaser schools were a little less attentive to their work and showed less emotional affect than did children in decreaser schools.

The findings from the comparison of increaser and decreaser schools are mixed. The variables found to be associated with success in reading in other studies do not discriminate between the increaser and decreaser schools. The consistent pattern of the direct teaching techniques is not found in either of these two groups of schools.

A significant problem with this analysis is that large and significant variance in the classroom performance of teachers and students can be expected within each school, as well as differences between the increaser and decreaser schools in the sample. Assignment to the increaser and

Table 8

"INCREASER" AND "DECREASER" SUBSAMPLE VALUES ON SCHOOL-LEVEL VARIABLES

Variable	Decreaser Schools $\bar{X}$	S.D.	Range	Median	Increaser Schools $\bar{X}$	S.D.	Range	Median
School size	731.3	256.6	345-1107	700.0	625.3	147.3	359-755	672.0
Percent low income	34.9	18.8	17-63	25.0	43.0	16.8	18-68	44.0
Percent limited- and non-English-speaking	20.3	18.2	0-47	25.0	10.1	10.6	0-29	6.0
Percent educationally disadvantage students	72.6	17.4	47-87	80.0	70.3	21.0	39-92	79.0
Mean Entry-Level Test Score*	22.26	2.43	19.01-24.61	23.69	24.60	2.28	20.38-27.33	24.97
Socioeconomic status index	1.56	0.24	1.35-1.95	1.42	1.71	0.41	1.14-2.41	1.61
Percent with Aid for Families with Dependent Children	28.9	16.0	13.5-47.9	18.0	36.7	21.2	17.6-75.4	25.7
Percent bilingual*	45.3	32.1	2.5-94.6	57.8	33.5	22.3	4.9-64.3	34.6
Mobility index*	39.1	5.6	29.2-45.9	40.0	35.4	10.6	18.5-52.6	34.3
Number of primary languages other than English	4.0	2.7	1-9	4.0	3.7	3.2	1-9	3.0
Number of years tenure of principal	-	-	1-10+	4.0	-	-	2-10+	4.0

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*Index developed by California Assessment Program, State Department of Education. For description, see Interpretive Supplement to the Report on the Reading Test, Second and Third Grades, 1977, California Assessment Program, Sacramento, CA, State Department of Education, 1977.

decreaser groups on the basis of school level information ignores the variance of classroom process and student achievement within schools. This is evidenced in the fact that standard deviations for the two groups were greater than the means for many variables. This suggests that teachers within schools were behaving very differently.

Also of interest to us were the test score differences of the classrooms within the two groups and the schools. These classroom means and gain scores for each class are portrayed in Tables 9 and 10. Scores for increaser schools are presented in Table 9 and those for decreaser schools are shown in Table 10.

Before examining the results in detail, we raised the following questions to structure the investigation:

1. Do classrooms within individual schools differ significantly from each other and from the school mean, or are these measures approximately the same?
2. Considering the school and classroom status and gain scores, how do the students in these schools compare with other California third grade reading students?

The first question concerns intraschool variability and, implicitly, the appropriateness of using average school statistics to describe heterogeneous classroom populations. Using the data in Table 9 we compared the school means for spring 1977 with the individual class means to determine if significant differences exist. The fourth column in Table 9 presents the posttest reading scores (spring 1977) for all third graders in each sample classroom as well as the overall mean for all third graders at each school.

Table 9

PRE, POST, AND GAIN READING SCORES OF CLASSROOMS "INCREASER" SCHOOLS

Increaser Schools	Grade	% Pre Score	% Post Score	% Gain Score	Matched Number of Students	Sub Group
School 101		61.6	71.9	10.3		
Teacher 01	3	61.9	80.6	18.7	21	5
Teacher 02	3	57.6	81.4	23.8	17	5
School 201		54.0	74.9	20.9		
Teacher 01	2-3	79.0	89.0	10.0	4	7
Teacher 02	2-3	58.0	77.0	19.0	8	5
Teacher 03	2-3	43.3	63.6	20.4	11	3
School 401		43.9	59.9	16.0		
Teacher 01	3	52.2	68.0	13.8	18	4
Teacher 02	3	36.0	52.9	16.9	9	2
Teacher 03	3	44.0	55.8	11.8	16	3
Teacher 04	3	36.0	48.6	12.6	13	2
School 603		54.4	70.9	16.5		
Teacher 01	3	53.8	71.1	17.2	13	4
Teacher 02	3	54.6	73.7	19.2	14	4
Teacher 03	3	56.0	75.8	19.8	18	4
School 801		47.6	65.0	17.4		
Teacher 01	3	50.8	67.4	16.6	14	4
Teacher 02	3	41.7	63.3	21.7	12	3
Teacher 03	3	50.1	74.1	24.0	17	4
School 901		63.3	64.3	1.0		
Teacher 01	3	63.0	65.7	2.7	12	6
Teacher 02	3	65.0	70.5	5.5	16	6
School 1001		75.4	90.4	15.0		
Teacher 01	1-3	73.2	88.6	15.4	7	7
Teacher 02	1-3	81.2	92.0	10.8	7	7
Teacher 03	1-3	84.0	97.3	13.3	6	7
State Average		67.7	81.7	14.0		

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n = 20 classrooms with pre- and posttest scores.

Table 10

PRE, POST, AND GAIN READING SCORES OF CLASSROOMS IN "DECREASER" SCHOOLS

Decreaser Schools	Grade	% Pre Score	% Post Score	% Gain Score	Number of Students	Sub Group
School 301		55.7	65.4	9.7		
Teacher 01	3	63.7	83.4	19.7	13	5
Teacher 02	3	56.0	57.7	1.7	14	6
Teacher 03	3	47.2	72.0	24.8	5	4
School 302		59.8	73.6	13.8		
Teacher 01	3-4	56.4	79.1	22.7	9	4
Teacher 02	3	59.5	74.4	14.9	15	5
Teacher 03	2-3	58.3	80.0	21.7	7	5
School 501		39.8	46.7	6.9		
Teacher 01	3	70.7	70.7	0	3	6
Teacher 02	3	—	—	—	-	
Teacher 03	3	—	—	—	-	
Teacher 04	3	16.6	34.8	18.3	7	1
Teacher 05	3	32.7	32.7	0	6	1
Teacher 06	3	—	—	—	-	
School 601		41.1	60.6	19.5		
Teacher 01	3	41.6	59.7	18.1	15	3
Teacher 02	3	34.8	57.4	22.6	14	2
Teacher 03	3	43.6	62.0	18.4	10	3
School 602		51.6	66.3	14.7		
Teacher 01	3	—	—	—	-	
Teacher 02	3	—	—	—	-	
Teacher 03	3	—	—	—	-	
Teacher 04	3	—	—	—	-	
School 701		46.3	57.7	11.4		
Teacher 01	K-3	28.0	36.0	8.0	2	1
Teacher 02	K-3	30.7	44.0	13.3	3	2
Teacher 03	K-3	54.7	57.3	2.7	3	6
Teacher 04	K-3	35.0	43.0	8.0	4	2
School 1101		51.6	66.9	15.3		
Teacher 01	2-3	41.2	61.7	20.6	7	3
Teacher 02	2-3	57.8	58.7	.9	9	6
State Average		67.7	81.7	14.0		

In seven of the fourteen schools there are significant differences between class and school means. (A significant difference is defined arbitrarily here as approximately 10 percentage points, the size of the standard deviation for the sample of schools in California.) Thus, in one-half of the schools in the sample, there are differences of at least one standard deviation between achievement levels of students in different classes. Consider the following examples:

School X	
Teacher 01	84.0%
Teacher 02	77.0
Teacher 03	63.6
Total School	74.9%

School Y	
Teacher 01	59.7%
Teacher 02	57.4
Teacher 03	62.0
Total School	60.6%

The interclassroom variability in these two schools is clearly not equal; significant differences between classroom scores can be found in School X but not in School Y. Correspondingly, the value and meaning of the school-wide "average score" is different at the two schools. In School Y this statistic is comparatively representative of achievement in individual classrooms, but at School X it is more misleading than useful because it glosses over important differences between classrooms and accurately describes only one of the three classrooms in the school. The classroom is the level at which instruction takes place and at which teaching strategies, techniques, and environments impact upon the student. To aggregate up from classrooms to schools, especially in situations similar to that of School X, means that these classroom effects and levels of achievement are cancelled out.

The second question we want to address is how classrooms in our sample, selected on the basis of their low ELT scores, compare with other California third grades. The mean score for California third graders in spring 1977 was 81.7% correct; when those students were second graders a year earlier in spring 1976, the mean score was 67.7% correct. Thus, the "average" California third grader had to gain 14 percentage points to maintain the same position in the score distribution for that cohort group. How do student gains in our sample compare? These data were presented in the fifth column in Table 10.

The results here are striking. Of the 32 classrooms for which we have pre- and posttest matched scores for 5 or more students,* 21 classrooms gained more than the state average of 14 percentage points. Eight of these classrooms were in decreaser schools. Again, the contrast between schools and class scores is illuminating: In several schools significant differences exist between the school gain and individual class gains. A dramatic example is presented below:

School X	
Teacher 01	19.7%
Teacher 02	1.7
Teacher 03	24.8
Total School	9.7%

We should note first that not all third-grade teachers at every sample school participated in the study; the absence of one or two classrooms helps explain why the school means on Table 9 and 10 cannot be computed from the scores of the classrooms presented. A second caveat is that our classroom means are based upon a matched sample of children, whereas the school means represent entire cohorts of children that change from year to year.

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* School 701 has grades K-3 in one classroom. Only 3 or 4 third-grade students have pre- and posttest scores. These classrooms and one in School 501 were not used in the analysis.

Thus, our classroom means are based on a subsample of children that may or may not be representative of the students at that school. The importance of this possibility is mitigated, however, by the following two considerations:

- None of the sample schools reported substantial demographic changes (such as a desegregation order) that would have affected their CAP scores between spring 1976 and spring 1977. This would suggest that students who left the classroom were replaced by students who were of similar background and achievement status.
- Examination of the characteristics of students in the matched sample of students indicated that they did not differ systematically from the overall school population on either the state-socioeconomic status index or percent-bilingual index.

These considerations do not then change the conclusion that significant differences exist between the rates of gain registered by classes within schools, and that the students in 21 classrooms identified as low-achieving gained more than the average California student during the third-grade year.

Partial Correlations of Process Variables and Reading Scores*

Of considerable interest to us was the question of whether the instructional processes used in these 45 ECE classrooms that were efficient in teaching reading would be similar to those found to be efficient in teaching reading in the Follow Through sample of third grades. To examine the question, we used all 45 classroom means and computed partial correlations between observate variables and posttest scores, holding constant the pretest scores.

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* These data were analyzed in several ways not reported in this paper. Those interested can request the total report, Early Childhood Education Classroom Evaluation, by J. Stallings et al. prepared for the Office of Program Evaluation and Research, Department of Education, State of California.

Based upon prior research, an *a priori* list of process variables was selected for use in the partial correlations. Of the 49 variables selected, 33 were found to be significantly correlated, $p > .05$. These are presented on Table 11. Because of the chance of collinearity of variables, these correlations must of course be interpreted with caution; however, if these findings are similar to the findings of other studies, they are more believable.

Unlike the findings in Follow Through, we find here that a lower ratio of students to teacher and aides is related to greater gain in reading. This may be explained by the fact the ECE classrooms have a considerably lower ratio of students to adults (12:1) than did Follow Through (18:1).

Other findings of ECE and Follow Through are very similar, especially those relating to student attention and teacher focus on reading. In classrooms where teachers assign students to groups the gain is greater, and in classrooms where games are used the reading gain is less (See Table 11, Variables 22, 25).

In classrooms where more time is spent on the reading activities the gain is greater (Var. 67, 242, 249, 374, 435). Also, as found in Follow Through, it does not seem efficient for teachers or aides to work with one child at a time, for in classrooms where this occurred very frequently the gain scores were lower (Var. 143, 155). It was more efficient to work with students in groups (Var. 88, 376, 420, 440).

It was also important to be task oriented. Adults providing academic instruction, asking academic questions, and students responding to the questions and receiving immediate acknowledgment or corrective feedback for their responses had a positive relationship with gain in reading (Var. 374, 354, 362, 395, 412). On the other hand, in classrooms where there was a high rate of group sharing, teacher out of the room, teacher not involved with children, social interactions, nonacademic questions and responses, the reading gain was less (Var. 62, 81, 244, 272, 293, 359).

Table 11

PARTIAL CORRELATIONS BETWEEN READING SCORES AND CLASSROOM PROCESSES *

(Number of classrooms is 38)

Variable Number	Description	Partial Correlations r	p
15	High ratio of students to teachers plus aides	-.43	.001
16	High ratio of students to teachers plus aides plus volunteers (i.e., all adults)	-.38	.01
22	Teacher assigns students to groups	.46	.001
25	Games, play equipment present	0.43	.001
40	General equipment used	.38	.01
45	All resouce material categories used	.34	.05
62	Group sharing time	-.42	.001
67	Average occurrence of reading per child	.31	.05
81	Teacher out of the room	-.36	.05
88	Teacher with small group	.32	.05
143	One child with teacher--reading	-.38	.01
155	One child with any adult--reading	-.37	.05
242	Percent activities on academic subjects	.41	.01
242	Percent of group time-sharing over total day	-.42	.001
249	Percent of time in reading over total day	.32	.05
272	Teacher not involved with children	-.40	.001
293	Number of observations begun with social interaction	-.43	.001
342	Adult to child—verbal	.32	.05
343	Child initiates verbal interactions	.41	.01
350	Child asks questions	.33	.05
352	Adult asks nonacademic questions	-.41	.01
354	Adult asks academic question of one child	.30	.05
359	Child responds to nonacademic question	-.40	.01

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* Holding spring 1976 test scores constant.

Table 11. Concluded

Variable Number	Description	Partial Correlations r	p
362	Child responds to academic question	.30	.05
374	Adult instruction--academic	.30	.05
376	Adult instructs a small group	.30	.05
394	All adult acknowledgment to students	.46	.001
395	Adult acknowledgment for academic question	.49	.001
412	Feedback to response to academic question	.42	.001
420	Adult works with small group	.29	.05
435	Total academic interactions	.43	.007
440	Adult communication to small groups	.41	.01
451	All adult direct academic questions	.29	.05

Subgroups Determined by Pretest, Posttest, and Gain Scores

Given that the 45 classrooms were all supposed to be from schools in the lowest 20th percentile of state scores, it was of interest to note that several classrooms showed very high performance, even in 1976. In fact, classroom averages in spring 1976 ranged from an average 30.7% correct to 84% correct. With such variations in the groups of students teachers received in the fall of 1976, teachers could be expected to use different instructional processes to teach them. Instructing a class of students who entered third grade with very low reading ability is likely to require different teaching techniques from instructing students who enter third grade with average or above-average ability. Partial correlations or stepwise regressions using the total sample of classrooms was likely to mask interesting process/outcome relationships in subgroups of classrooms.

To further examine the relationships between classroom processes and achievement, we wanted to see whether we could define instructional processes most relevant to producing test score gains for particular groups of classrooms. We hypothesized that a teacher of a classroom with a posttest/pretest difference of 15% and an initial test level of 40% might differ in approach to teaching from a teacher whose class had an identical gain but started with a pretest level of 70%. Therefore, a scattergram plotting posttest versus pretest was created to attempt a clustering of classes on the basis of pretest level and amount of test-score gain (see Figure 7).

The determination of achievement groups required several steps. First, a "no gain" line was defined (posttest-pretest=0) where there was no difference between posttest and pretest score means. Second, to be consistent with other studies of this type, a "gain" line was set at one standard error above the no-gain line (Tickunoff, Berliner, & Rist, 1975).

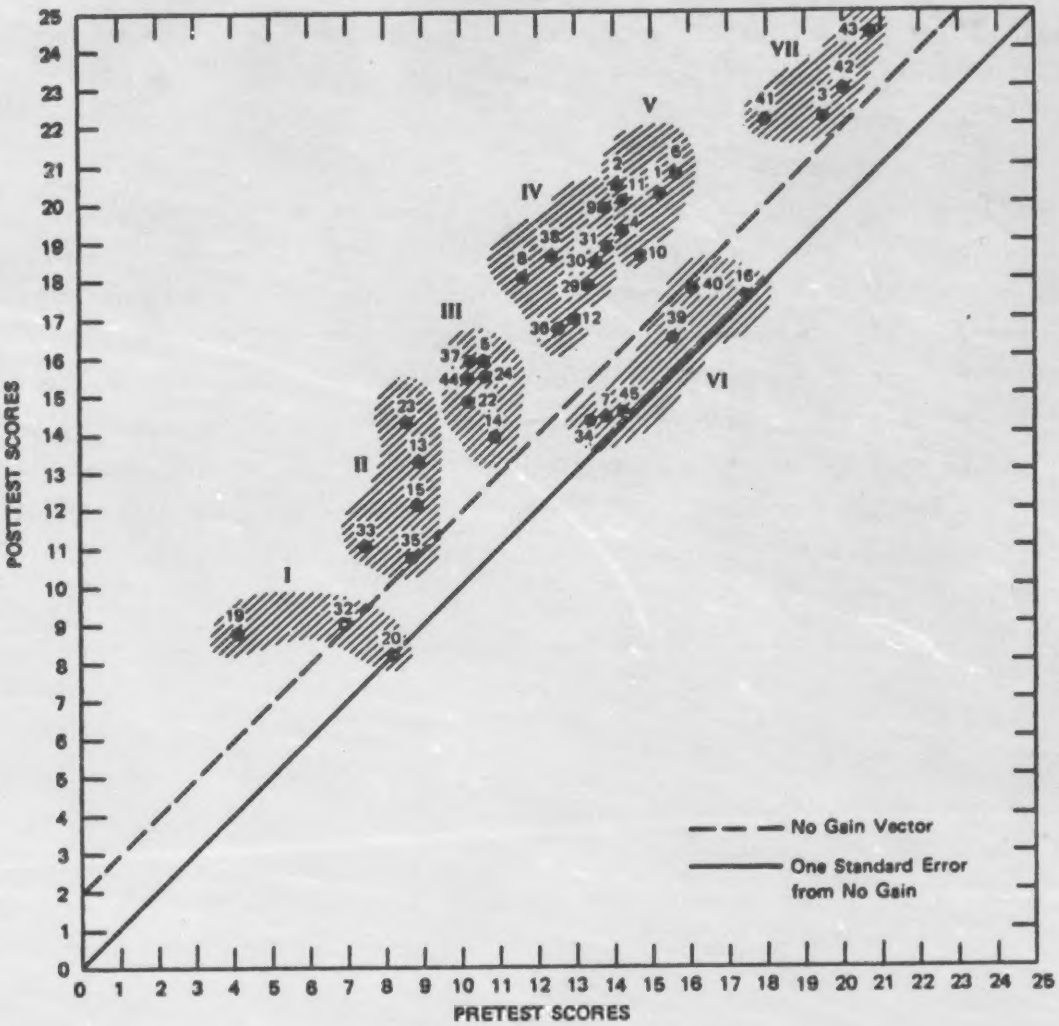

Figure 7. Scattergram of ECE third grade pretest and posttest scores.

The no-gain group, then, becomes those classrooms with posttest-pretest differences falling between the standard-error gain line and the no-gain line. Third, the classrooms were assigned to seven groups on the basis of pretest levels. The scattergram resulted in the groups of classrooms exhibited in Table 12.

A special note is required on the *a priori* determination of Groups IV (medium pretest/gain) and V (high-medium pretest/gain). The 14 classrooms involved all exhibited similar gain, but the variance of the pretest scores was substantial. Therefore, in order to obtain the most appropriate comparison group for Group VI (high-medium pretest/no gain), the 14 classrooms were split into two pretest groups: Group V was statistically equivalent to the pretest level for Group VI, while Group IV had a lower average pretest. A comparison of Groups V and VI indicated no statistical differences in the test scores of the two groups at the beginning of the third-grade year:

Group V: $\underline{\bar{X}}$ raw score = 15.04
Group IV: X raw score = 15.30
$t = 5.60$; $p = .12$ (no statistical difference)

In addition to the high-medium pretest gain/no gain comparison, we attempted to find an analogous situation at the lower pretest level. Groups I and II, then, were identified and an F test was conducted to examine the difference in pretest score level. Unfortunately, the average pretest level for the two groups was significantly different, so that a gain/no gain comparison controlling for pretest level was not possible:

Group I : $\underline{X}$ raw score = 6.44
Group II: X raw score = 8.63
$F = 5.51$; $p = .06$ (significantly different at the .10 level)

From the seven groups formed, only Groups V and VI were selected for comparison. Groups V and VI both started with scores of approximately 60% correct but only Group V gained.

Table 12

NUMBER OF CLASSES IN EACH SUBGROUP

	Group	Number of Classes	Pretest Score*	Percent Gain
I	Low pretest/no gain	3	37%	8%
II	Low pretest/gain	5	37%	12%
III	Low-medium pretest/gain	6	41%	15%
IV	Medium pretest/gain	8	47%	16%
V	High-medium pretest/gain	6	57%	14%
VI	High-medium pretest/no gain	6	54%	7%
VII	High pretest/gain	4	73%	10%
	Total	38		

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*Percent of total correct.

We thought it would be of interest to see how these groups differed on the process variables being used in the classrooms. In order to see whether these two sets of subgroups differed initially, several analyses were conducted.

Discriminant analysis. Of interest was the comparison of the appropriate gain/no gain groups from the scattergram (i.e., high-medium/gain versus high-medium/no gain). Groups V and VI also produced two variables and one discriminant function that was sufficient to classify all the classes into the appropriate *a priori* groups (Table 13). The gain group had a lower ratio of children to adults (more adults per student) and more teacher acknowledgment in academic tasks.

These discriminant analyses presented a statistical confirmation of the gain/no gain groups derived from the scattergram, providing the researchers with a measure of confidence in proceeding with analyses to determine within-group composition and intergroup differences. The remaining groups were kept primarily for descriptive purposes.

Analysis of variance. In order to examine intergroup differences, two sets of one-way analyses of variance, using the same variables selected for the discriminant analyses, were conducted. That is, all seven groups were compared in addition to Group V versus Group VI. See Table 14 for descriptive statistics of the seven groups.

Medium-high pretest scores. Twelve classrooms had medium-high pretest scores. These pretest scores ranged from 54.7% to 70%. During the third-grade year, six of these classrooms (Group V) made gains of between 14.9% and 23%.

Three of these were located in increaser schools and three were in decreaser schools. Six other classrooms (Group VI) made gains of only 0.9% to 6.9%. Two of these classrooms were in increaser schools and four were in decreaser schools.

Table 13

CLASSIFICATION OF GROUPS V AND VI
BY DISCRIMINANT ANALYSIS

Actual Group	Number of Cases	Predicted Group V	Group Membership Group VI
Group V	6	6	0
		100.0%	0.0%
Group VI	6	0	6
		0.0%	100.0%

Note: Percent of "grouped" cases correctly classified = 100%.

Table 14

DESCRIPTIVE STATISTICS OF SEVEN GROUPS

Group	Number of Classes	Mean Number of Students	Ratio		Absence		Pretest Raw Score		Posttest Raw Score		Gain Raw Score	
			$\bar{X}$	S.D.	$\bar{X}$	S.D.	$\bar{X}$	S.D.	$\bar{X}$	S.D.	$\bar{X}$	S.D.
I Low pretest/no gain	3	31.0	13.03	2.00	10.70	3.65	6.44	2.07	8.63	0.42	2.19	2.29
II Low pretest/gain	5	29.6	15.00	5.72	12.58	4.06	8.63	0.55	12.30	1.32	3.67	1.36
III Low-medium pretest/gain	6	28.7	13.82	5.20	13.23	4.84	10.43	0.30	15.26	0.73	4.62	0.89
IV Medium pretest/gain	8	40.3	11.66	2.67	9.54	2.43	13.16	0.79	18.16	0.98	5.00	0.87
V High-medium pretest/gain	6	22.4	5.85	2.30	11.50	3.73	15.06	0.65	19.84	0.90	4.80	0.79
VI High-medium pretest/no gain	6	28.5	13.31	2.83	10.45	2.50	15.30	1.54	15.86	1.58	0.56	0.68
VII High pretest/gain	4	25.5	11.66	1.68	6.25	6.33	19.83	1.15	22.93	1.01	3.10	0.62
State average							16.92		20.42		3.25	

Twice as many students were present in the classroom for Group VI, the no-gain group, and the ratio of students to teacher was much lower in Group V, the gain group. The ratio was approximately thirteen children to one adult in the no-gain group. The difference in this ratio could account for much of the test score difference, but how the aides and teachers work with the children is of primary importance.

The two groups differed in the instructional processes used in several important ways (see Table 15).

Summary of gain and no-gain analysis of variance. In the six classrooms of Group V, students started the third grade with test scores lower than the average for the state. In all six classrooms, the students gained as much or more during the year as the average gain for the state. In four of these six classrooms, the achievement was so great that their scores were as high or higher than the state average by spring 1977 (see Table 14). In the classrooms that showed such gains, the classes were smaller and the ratio of children to adults was lower. The teachers more often instructed small groups and used a direct approach to teaching reading. They more often used educational equipment and materials including audiovisual equipment. During nonacademic activities they more often asked open-ended questions and children more often made extended responses.

In Group VI, the no-gain classrooms, the teachers more often worked with one child at a time and the other children worked independently. More arts and crafts occurred, and more dramatic play. Teachers were less often directly involved with children, and there was more negative behavior displayed.

To promote better achievement in reading, the implications here for program planning would be, it seems, to encourage teachers to work with small groups, keep engaged with the children, allocate time for reading throughout the day, and use a direct method to teach reading (question-response-feedback).

Table 15

PROCESS VARIABLES ON WHICH GROUPS V AND VI DIFFER

Variable Number and Description		Group V (n=6) $\bar{X}$	Group VI (n=6) $\bar{X}$	p
010	Number of children enrolled	22.40	40.33	.05
011	Number of children present	15.90	32.03	.04
015	Child/teacher and aide ratio	6.65	14.33	.01
016	Child/adult ratio (teachers, aides, and volunteers)	5.85	13.31	.001
040	General equipment, materials used	3.80	1.83	.07
048	Achievement charts present	1.00	0.50	.07
059	Children's story books used	0.80	0.17	.04
081	Teacher out of room	0.91	6.95	.04
082	Wide variety of activities, concurrent	1.60	1.09	.03
083	Wide variety of activities over one day	6.80	4.64	.07
104	Adult with one child	8.85	20.12	.08
117	Large group of children independent	10.12	22.23	.06
124	One child with aide--math	0.33	1.21	.04
132	One child with any adults--math	0.78	2.17	.09
139	Large group of children independent--math	17.31	48.33	.04
163	Approximate number of times children were recorded in reading over one day	100.00	85.00	.10
165	All children independent--reading	35.52	62.05	.06
211	Large group of children with teacher--arts and crafts	0.00	42.70	.08
237	Audiovisual equipment, academic activities	8.02	1.04	.08
272	Teacher not involved with children	0.00	6.52	.08
281	Number of FMOs with arts and crafts as beginning activity	0.20	1.17	.07
355	Adult open-ended questions to children, nonacademic	0.08	0.01	.04
368	Child responds to adult open-ended question	0.11		.01
369	Child extended response, nonacademic	0.17	0.07	.05
373	Adult instructs all children	1.39	0.43	.09
376	Adult instructs a group	3.68	1.41	.05
394	All adult acknowledgment to children	3.23	1.69	.02
395	Adult acknowledgment to children, academic	2.23	1.13	.04
397	Adult acknowledgment to children other than task-related	0.97	0.51	.09
404	Adult praise, other than task-related	0.26	0.08	.05
412	Adult feedback for child response to adult academic command, request, or direct question	1.55	0.68	.05
428	Negative behavior, adults to children	0.05	0.15	.09
434	Dramatic play, pretending	1.61	3.21	.02
452	All adult open-ended questions to children	0.18	0.02	.02
454	Child's extended response	0.64	0.22	.03
463	All negative behavior	0.05	0.15	.05

These findings are very similar to those reported in the partial correlation analysis in the preceding section. The exception is that in this narrower band of ability levels some important variables did emerge (open-ended questions, child extended responses) that did not have an effect over the whole sample.

Conclusions

The in-depth study of selected ECE classrooms indicates that the instructional methods or processes used in some classrooms are more efficient in teaching reading than those used in other classrooms. Of particular importance is the finding that when there are fewer students per adult, the classroom gain is greater and the absence rate is lower. This relationship was found in the overall partial correlations for classrooms and studied in greater detail in the subgroup comparison of Groups V and VI. Group V, which gained in reading, had a lower ratio of children to adults (6 to 1); Group VI, the no-gain group, had a ratio of 13 to 1.

However, it is not enough merely to have more adults in the classroom; how the groups are organized and managed is of critical importance. Teachers in the classrooms that gained very little (Group VI) more often instructed one child at a time even though their ratio of adults to children was quite high. This organization of staff then left the other students working for longer periods of time on their own. Misbehavior and negative affect occurred more frequently in classrooms organized in this manner.

Again, this does not imply that individualized programs are bad or the children should not be tutored or taught on an individual basis in reading labs. It does imply that allocating one staff person to work with one student for very much of the class period is not an efficient strategy.

In the group of classrooms (Group V) where students made excellent gains in reading, the adults more often worked with small groups of students. They most often used directive teaching methods, providing instruction and asking questions or asking students to read aloud. The students' responses were given immediate feedback. If the response was correct or satisfactory, they received acknowledgment or praise, and if it was incorrect, they were guided to a correct response. These teachers were very successful in keeping students on task and consequently very little misbehavior was recorded in these classrooms.

Interestingly, three of the six classrooms (from Group V) which used these more efficient methods were in schools identified as "increaser schools" and three were in schools identified as "decreaser schools." Our data do suggest that some of the schools in our sample and the classrooms therein do not fit neatly into the classifications of "increaser" or "decreaser schools."

In 16 classrooms of "decreaser schools," the students started the third-grade year with test scores (16.60% to 59.50%) lower than the average for the state (67.7%). Nine of these low-entering classrooms gained as much or more (14.9% to 24.8% gain) during the third grade as did the average classrooms in the state (14% gain). Two of the classrooms in "decreaser schools" not only showed striking improvement, but achieved scores by the end of third grade as high as the state average for third grade (81.7% average).

In the twenty classrooms of "increaser schools," four started the third grade with scores above the average for the state. Twelve of the twenty gained more than the average gain for the state. Six of the twenty had scores at or above the state average for third grades at the end of the third-grade year.

Implication of SRI Findings

The practice of reporting achievement in terms of school scores ignores differences in the performance of teachers and students within the schools. Another problem in this type of reporting is in using schools as the level of analysis. This practice has recently received sharp criticism. In the American Sociological Review, Alexander and McDill (1976) summarize the school-level studies of Coleman (1966), Mostellen and Moynihan (1972), Jencks (1972), McDill and Rigsby (1973), Alexander and Eckland, (1975). The authors conclude that "educational outcomes are largely independent of all school-to-school differences. These results of the research on schools have been reproduced over a wide range of school outcomes on numerous samples of students with various analytic strategies. The acceptance of the proposition that school level analyses are unproductive is reflected in the redirection of recent research on teaching and learning."

Many requests for proposals issued by the National Institute of Education and the U.S. Office of Education specify their preference for classroom or student levels of analysis and request that classroom processes be documented. Several such research efforts by Wiley and Harnischfeger (1976), Brophy et al. (1975), Gage (1976), and Stallings (1975) report that quality of instruction within classrooms is related to student achievement. These researchers have noted that differences in student outcomes are associated with differences in teachers' classroom practices. Their findings, like those of this report, suggest that teachers who organize classrooms so that students are kept on task and not distracted have students who perform better on achievement tests. Such differences in teaching processes and student achievement are not detected in research that uses the school as the unit of analysis. The influence upon student achievement by teachers within schools is systematically neglected in traditional research on school effects. The assumption that education within schools is homogeneous is not a reasonable one.

VI. TEACHING BASIC READING SKILLS IN SECONDARY SCHOOLS

This study was developed in response to the need to know more about teaching remedial reading in secondary schools. The need for remedial reading for junior and senior high school students is shown by the fact that during the past 10 years several suits have been brought against local and state governments by parents whose children have graduated from high school but cannot complete employment applications nor pass reading exams given by the U.S. Army (or employer). In 1978, only 53% of California's high school students who took the state equivalency exam passed it.

A two-phase study of teaching basic reading skills in secondary schools was funded by the National Institute of Education.* The purpose of the study in Phase I was to identify teaching processes that are efficient in helping secondary students learn to read. In Phase II of the study, the identified processes were translated into "teacher should" statements, and four inservice workshops were organized for secondary teachers, at which the findings were presented and recommendations were made for changes in the classroom behavior of each teacher. Phase II was an experimental design where 50% of the teachers were trained and 50% were not trained until the end of the school year 1978.

Phase I

Phase I was designed to answer several questions regarding the relationship between student gain in reading and teaching processes in secondary classrooms. We hypothesized that the same teaching strategies found to be effective in teaching reading in elementary schools might also be effective in teaching reading in secondary schools. Several hypotheses were then generated based upon the prior research of Stallings and Kaskowitz (1974), Brophy and Evertson (1976a), and Soar (1973).

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* Contract NIE-6-77-0001 with SRI International.

To be tested were four empirical findings from this work:

- Teacher reinforcement for correct responses and guidance for incorrect responses are positively related to academic achievement. The value of feedback has been well documented in learning theory and in the Follow Through studies.
- The frequency of reading-related verbal interactions is positively related to student achievement in reading.
- The number of social interactions has a negative relationship with reading achievement.
- The student absence rate is related to the positive affect recorded in the classroom; i.e., the more supportive the environment, the lower the absence rate.

When the study was funded in mid-December 1976, 43 teachers in 6 school districts volunteered to take part in Phase I of the study. Table 16 shows how these teachers and their students were distributed across sites and grade levels. Except for Tulare, the districts are all medium-sized cities with all the problems found in urban schools: overcrowding, teacher anxiety over cutbacks, and student unrest (in one school a student was killed on opening day).

To describe the classroom processes, the SRI Secondary Observation Instrument (SOI) was developed for this study with assistance from several secondary teachers, using previous observation systems developed at SRI. The SOI provides a gestalt of the classroom. On a "Snapshot" matrix, information is recorded regarding the materials being used, specific reading activities occurring, and grouping patterns at the time of the Snapshot. Following this description of the environment, the academic or social interactions between teachers and students are recorded on a Five-Minute Interaction form.

Table 16

PHASE I SAMPLE OF TEACHERS AND STUDENTS BY DISTRICT

	Junior High		Senior High		Total	
District	Students	Classes	Students	Classes	Students	Classes
Fresno	119	5	192	9	311	14
Monterey	44	3	—	-	44	3
Ravenswood	49	2	—	-	49	2
Salinas	181	7	72	3	253	10
Sequoia	—	-	54	4	54	4
Tulare City	194	10	—	-	194	10
Total	587	27	318	16	905	43

Observers from each location were trained at SRI, Menlo Park, in an 8-day training session. All observers were required to pass a criterion coding test before collecting data. Each classroom in the sample was observed for 3 days, with 5 Snapshots and 5 Five-Minute Interactions per class period, for a total of 15 each.

Two student rating scales were also used to describe classroom process. The Classroom Environment Scale, From R (Moos & Trickett, 1974), was normed on a sample similar to ours. It yields nine subscales of student perception, i.e., level of involvement, teacher control. The Student Rating of Instructors asked students to rate their instructor on 16 variables. This instrument yielded 4 subscales, e.g., teacher professionalism,* fairness.

The Comprehensive Test of Basic Skills (McGraw-Hill, 1977) reading scores from spring 1976 and spring 1977 were used as a measure of outcomes. These scores were standardized because several different levels and forms of the test had been used in the districts.

Absence data were collected for each class in the study. Classroom processes were expected to explain some of the variance in classroom absenteeism. The relationship between reading achievement and absenteeism was also investigated.

Initially, we planned to perform only partial correlation and stepwise regression analyses for the sample, as had been done in the Follow Through Observation Evaluation, 1972-73 (Stallings & Kaskowitz, 1974). However, the data collected for the Basic Skills Study indicated that student pretest scores varied widely within classrooms (as much as from Grade 2 to Grade 13 equivalence). With such variations, teachers could be expected to use different classroom processes for those at different levels of attainment. Partial correlations or stepwise regressions using the total sample were likely to mask interesting process/outcome relationships in subgroups of classrooms.

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*The components of professionalism were assumed to be "knows the subject matter, makes assignments that are clear and assigns meaningful work, and maintains order."

Partial correlations. To identify classroom processes that affected student achievement, we computed partial correlations, holding spring 1976 reading scores constant. A total of 116 variables developed from Snapshot and Five-Minute Interaction codes were selected by the principal investigator for use in the analysis. The observation and test data for 36 classrooms which had sufficient test data were included in this analysis. Table 17 identifies 28 observed process variables that were significantly correlated ($p > .10$) with achievement.

Two of the highest positive correlations with reading achievement are Snapshot process variables describing students reading aloud either to a teacher ($r = .40$) or to the whole group ($r = .59$). Two other variables with high positive correlations with reading are the teacher discussing the reading work ($r = .41$) and guiding students who say they do not know the correct answer by asking further questions ($r = .52$). All four of the above variables describe a classroom environment where the students are focusing on the task of learning to read.

Many of the negative correlations describe off-task behavior, the largest of which is social interactions ($r = -.52$). The more often students engage in social conversation the less often they are reading. All negative corrective feedback about social events to students for behavior or for reading also seems ineffective in helping students gain in reading ability. Brophy and Evertson (1978) confirm that in junior-high English classes learning was facilitated in classrooms where students were orderly and the teacher did not have trouble controlling them.

PARTIAL CORRELATIONS OF PROCESS VARIABLES AND STUDENT READING ACHIEVEMENT*

(N = 36 Classrooms)

Table 17

Variable Number	Description	r	p
Snapshot			
TBM2	Students read aloud with teacher from workbook	.40	.001
TDM7	Teacher instructs using chalkboard	.23	.10
TEM9	Teacher discusses the reading task	.41	.001
TLM2	Teacher grades papers	-.24	.10
IAM2	Students read silently from workbooks	.30	.05
IAM1	Students read aloud from texts to the class	.59	.001
IIM3	Students take tests or quizzes	.25	.10
IKM9	Social interactions	-.52	.001
IOM9	Student uninvolved	-.27	.10
FMI			
5	Adults—Interaction with individuals	-.25	.10
7	Adults—interaction with entire group	.23	.10
9	Student questions, or requests about reading	-.22	.10
44	Adult response to students' questions	-.21	.10
54	Student reading aloud	.24	.10
61	Adult instructs small group in reading	.21	.10
62	Adult instructs entire class in reading	.23	.08
76	Adult acknowledges student behavior	.25	.10
92	Adult gives negative corrective feedback for task or reading	-.21	.10
94	Adult gives negative corrective feedback for behavior	-.23	.10
105	Adults not interacting with students	-.23	.10
113	All classroom interactions related to student behavior	-.23	.10
116	All positive interactions	.24	.10
117	All negative interactions	-.29	.05
121	Students sent from classroom for disciplinary reasons	-.26	.10
126	Adults offer students a choice of activities	-.33	.01
131	Students say 'I don't know the answer'/adult probes student	.52	.001
136	Adult asks with student response to reading question unacceptable/adult asks another student	-.21	.10
160	Adult interaction with intruder	-.25	.10

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*Spring 1976 CTBS reading scores were held constant.

In the Follow Through Grade 3 observation study, we found a relationship between a relatively frequent use of workbooks or textbooks and reading achievement. Similarly, we find a correlation between reading in textbooks and workbooks and higher reading scores in the secondary school classroom. Also, it appears that what students do should be teacher directed since in both the Follow Through Grade 3 data and these data, the gain is less in classrooms where students are allowed to choose their activities. Soar (1973) also found student free choice and free work groups were associated with less achievement gain.

The Follow Through data indicated that children prospered more when the teacher focused attention more frequently upon a large group or the total group rather than when the teacher worked with one student at a time. Working with a group or the total class was also more efficient at the secondary school level. This does not mean that working with individuals is poor practice. It does suggest that when the teacher spends a large amount of class time with one student, the other students may not receive the instruction or feedback they need. Thus, it is important to organize the classroom to provide instruction to the maximum number of students possible for the longest possible period of time. Evertson et al. (April, 1977) suggest that teachers could profitably spend from one-third to one-half of their time in teaching groups of eight or more children as well as the whole class. Teachers can effectively teach each child for more time in large groups.

In the Follow Through data, all of the variables that included positive or negative corrective feedback or praise for student responses in reading were positively correlated with achievement. The findings for the feedback variables in the secondary school study differ; negative corrective feedback has a negative relationship to reading achievement (Var. 92), while probing the student when he says, "I don't know," or adding some information has a positive relationship to reading achievement (Var. 131). Asking leading questions is a way to keep students involved and allow them to experience success. It is a positive way to finally elicit the correct response. Going to a different student at this point had a negative relationship to achievement. Brophy and Evertson (1978) found that in low-ability classrooms "don't know" responses were positively related with learning. They do not describe how the teacher followed up the "I don't know." In junior high math classes they found that low-ability students achieved more if the teacher persisted in questioning when the student failed to answer correctly.

Interactions among students or teachers which are social in nature had a negative relationship to achievement in both the Follow Through elementary school data and the Basic Skills secondary school data. This does not imply that social conversations should not occur at all; it does mean they should not occur during reading class.

To achieve the most in reading, both the Follow Through data and the Basic Skills secondary school data suggest that students should spend much of their time in class in reading workbooks and textbooks; that teachers should be directive and use positive feedback while working primarily with a group of students or the total group; and that social interaction during class time should be kept at a minimum.

We thought it would be of interest to see how the students' ratings of teachers relate to student outcomes. At the secondary school level it seemed likely that students could provide useful information regarding classroom process by reporting their experience in the classroom: Was the teacher prepared? Were the rules clear? Did the teacher keep control of the class? Partial correlations (holding spring 1976 reading scores constant) were computed to examine the relationship between achievement and the student ratings. The results of these analyses are presented on Table 18.

Table 18

PARTIAL CORRELATIONS OF STUDENT RATING SCALES WITH READING ACHIEVEMENT*

Subscales	r	p	Scale Range
Student Rating of Instructors (N = 714 students, 36 classrooms)			
Professionalism	.35	.01	8-40
Individual attention	.41	.001	7-35
Fairness	.27	.05	1-5
Student enjoys class	.33	.01	1-5
Classroom Environment Scale (N = 718 students, 36 classrooms)			
Involvement	.27	.05	1-4
Affiliation	.12	NS	1-4
Teacher support	.26	.05	1-4
Task orientation	.26	.05	1-4
Competition	.06	NS	1-4
Order and organization	.25	.05	1-4
Rule clarity	.17	NS	1-4
Teacher control	.07	NS	1-4
Innovation	.18	NS	1-4

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* Spring 1976 reading scores were held constant.

All four of the Student Rating of Instructors subscales (professionalism, individual attention, fairness, and enjoys class) are significantly correlated with achievement at $p.<.05$. Individual attention is the highest of all correlations ($r = .41$): The seven items of the subscale are rated on a scale of 1-5. The seven items reflect students' personal experience, for example:

- I find it hard to talk with teachers or easy to talk with this teacher.
- This teacher never listens to what I have to say or always listens to what I have to say.
- The teacher is not interested in me as an individual or is interested in me as an individual.

Four of the subscale correlations from the Classroom Environment Scale are significantly related to achievement at $p.<.05$. They are involvement, teacher support, task orientation, order and organization. These correlations are all lower than those of the Student Ratings of Instructors (SROI). Since each scale has a range of scores of only 1-4, the variation between classrooms cannot be great; thus, the correlations are likely to be lower.

An intercorrelation of the subscales indicated that similar dimensions are being assessed by the two rating instruments. For example, individual attention on the SROI is correlated .75 with teacher support.

The number of significant findings from the student ratings were a pleasant surprise. This turned out to be an important source of classroom descriptors. Overall, the data suggest that students achieve more in reading within environments that they perceive to be supportive, where the teacher is professional and well organized, and where students are involved in their work and are task persistent.

Table 19

CORRELATION OF ABSENCE RATE AND PROCESS VARIABLES
(N = 35 Classrooms)

Variable Number	Description	r	p
A	Affiliation	-.60	.001
RC	Rule clarity	-.34	.05
TEM9	Teacher discusses reading	-.34	.05
TLM9	Teacher manages classroom	-.36	.05
IAM8	Students use leisure reading books	+.34	.05
IGM5	Students do written assignments in reading kits	-.41	.01
10	Students ask teachers questions about the task	-.32	.05
77	All teacher's acknowledgment given to students' performance	-.32	.05
85	Teacher praises and acknowledges students for reading	-.38	.05
86	Teacher acknowledges student for reading and other tasks	-.33	.05
87	All praise and acknowledgment to students	-.36	.05
90	Guiding corrective feedback	-.35	.05
116	All positive interactions	-.32	.05
120	All warm supportive interactions	-.33	.05

Carolyn Evertson et al. (1978), and Linda Anderson et al. (1978) both report on student ratings of teachers in the Texas Junior High School Study. Their findings are similar to ours. Low-ability students who liked their teacher gained more in math. Our students who enjoyed the class and thought the teacher was fair gained more. As in our study, their students achieved more in classrooms with smooth classroom control. They did not like disruptive behavior and did like warm supportive relationships.

The absence rate of junior and senior high school students is a national problem. The range of average absence rates for the 40 classrooms with absence data is from 6 to 35 days per student per year. The burden on the teacher is great when students are absent frequently.

Many reasons can be cited for absence from class: illness, work, caring for younger siblings, expelled from school, doctor appointment, other school activities, and staying away from class with friends. Students are not necessarily absent all day; they often go to some classes but not to others.

In the Follow Through Classroom Observation Evaluation 1972-73, we found that in classrooms where the students had more choice of materials, activities, and work groups, and where they could ask questions and talk to each other a little more, they were absent less often. Based upon this prior research, we wanted to see whether some classroom variables at the junior and senior high level could be related to student absence rate.

Correlations were computed using all of the student rating subscales and selected classroom process variables with absence rate. Out of the 140 correlations, 14 were significant at $p < .05$. Variables whose relationship was significant at the $p < .05$ level are included on Table 19. The subscale most related to low absence rate is Affiliation. This suggests that students go to class more frequently when they feel the other students in the class are friendly, and easy to be with. This finding is interesting, but not surprising. Most people at any age prefer classes where they know and like the other students. The second subscale most related to low absence rate is Rule Clarity. This suggests that while teachers should discourage social conversations among students, they should promote an environment where students are supportive of each other.

These data suggest that in classrooms where teachers were warm and supportive (Var. 120) and acknowledged or praised students for achievement in reading or task-related work (Var. 77, 86 and 87), the students are absent less often. Variables 77 and 86 are a subset of Variable 87. In classrooms where the teacher spent time managing (Var. TLM9), held discussions (Var. TEM9), and made the rules clear (Var. RC), the students were absent less often.

From the student ratings we learned that students were absent less often in classrooms where they more frequently felt the class was friendly (Var. A), asked questions about the task (Var. 10), and did written assignments from reading lists (Var. IGM5).

An unanticipated relationship was found between leisure reading and absence rate. Students came to class less frequently in classrooms where they more frequently engaged in leisure reading. It would seem more likely that students would enjoy leisure reading and be absent less frequently in such classrooms. However, a high level of leisure reading can reflect lack of teacher direction and insufficient classroom structure (i.e., some leisure reading is good but too much is too much). Also leisure reading may relate to absence differently in subgroups of classrooms depending upon reading ability.

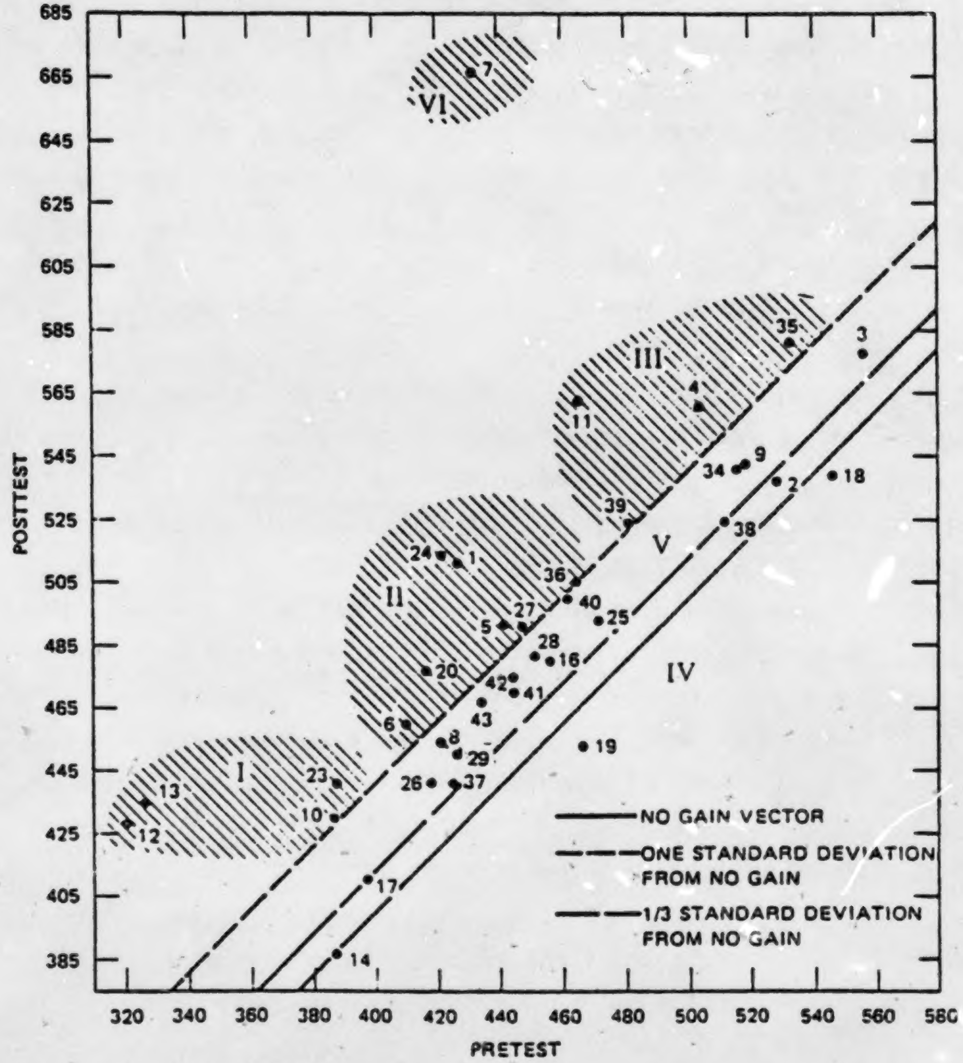
The process variables related to absence rate in the Basic Skills study are somewhat different from those found in Follow Through. In the Follow Through study, students were absent less often when they were in open class structures, that is, when they had more choice about activities and made more social comments to each other. In the Basic Skills study, the students were absent less often when they felt that other students were friendly, when the rules were clear, when they received positive reinforcement from teachers, and when they could ask questions about the reading tasks. Variables from both studies describe a warm, supportive environment.

Correlations should, of course, be interpreted with considerable caution. The intercorrelation of several variables can be expected to be very high.

The primary objective of the Basic Skills study is to examine the relationships between classroom processes and achievement in terms of defining those processes most relevant to producing high test score gains. In order to explore these relationships, "gain" must be tempered by the level of the pretest. That is, it was hypothesized that a classroom with a pretest-posttest difference of 50 units and an initial low test level would differ in instructional processes from a classroom with an identical gain but a high pretest level. Therefore, a scattergram plotting posttest score versus pretest score was created to attempt a clustering of classes on the basis of pretest level and amount of test score gain (see Figure 8).

Four classrooms without either pretest or posttest information were omitted from the analysis. Three additional classes with mean test scores based on fewer than one-third of the students were eliminated because of a concern over the lack of representativeness of the class means.

The determination of achievement groups required several steps. First, a "no-gain" line was defined (posttest - pretest = 0); that is, there was no difference between pre-and posttest score means. Second, as in other studies of this type (e.g., McDonald, 1976), the "gain" line was set at one third of the standard deviation of the mean class gain scores (13 units) above the no-gain line. The no-gain group, then becomes those classrooms



Group I - Low Pretest/High Gain
Group II - Moderate Pretest/Moderate Gain
Group III - High Pretest/Moderate Gain
Group IV - No Gain
Group V - Slight Gain
Group VI - Case Study Classroom

Figure 8. Scattergram of pretest and posttest—CTBS scores.

with possttest-pretest differences falling between the one-third standard deviation gain line and the no-gain line. Third, test measurement error and the possibility of unstable classroom mean test scores (i.e., those classes with a small percentage of the total class having both pretests and posttest scores) make it impossible to classify some classrooms as either no-gain or gain. Given the probabilities of measurement error, why should one classroom with a gain of 12 units be classified as no-gain when another classroom with a gain of 18 units is allocated to a gain group? Therefore, "slight-gain group" was defined as those classrooms with posttest-pretest differences falling between one-third standard error (13 units) and one standard error (40 units). Fourth, the "gainers" were assigned to three groups on the basis of prescore levels: Group I, low pretest/high gain; Group II, moderate pretest/moderate gain; and Group III, high pretest/moderate gain (see Figure 8). Additionally one class was identified that had a gain of 234 standard score points. This class was treated as a special case study rather than arbitrarily forced into an inappropriate group. The pretest/posttest scattergram resulted in the groups of classrooms shown in Table 20. A discriminant function analysis confirmed the groups defined in Figure 8.

District demographic characteristics (such as amount of money spent per student) did not explain why some classrooms gained and others did not. No one group was made up of classrooms all from the same district, and the two largest districts had some classrooms in each of the five achievement groups.

Analysis of variance. In order to examine intergroup differences, one-way analyses of variance, using the same variables selected for the discriminant analyses, were conducted. Variables found to be significantly different at the .10 level were then chosen as discriminants of the four groups.

Because of the nature of a simultaneous comparison of the four groups in an analysis of variance, it was felt that some comparison between the no-gain group and the low pretest/high gain group, the moderate pretest/moderate

Table 20

DEMOGRAPHIC CHARACTERISTICS OF THE ACHIEVEMENT GROUPS

Group	Number of Classes	Number of Students		Heterogeneous Groupings		Days Absent		Pretest Scores (CTBS)		Post test Scores (CTBS)		Gain	
		X̄	SD	X̄	SD	X̄	SD	X̄	SD	X̄	SD	X̄	SD
I Low Pretest/ High Gain	4	26.50	2.08	0	0	13.77	4.39	354.43	35.65	433.12	5.80	78.69	33.74
II Moderate Pretest/ Moderate Gain	7	23.00	7.37	.03	.06	15.86	4.71	423.25	19.30	492.77	20.00	60.52	21.20
III High Pretest/ Moderage Gain	4	25.50	4.04	.36	.24	8.80	5.67	495.71	29.50	557.91	24.93	62.20	25.46
IV No Gain	7	22.29	4.07	.10	.12	10.19	6.44	465.26	64.83	470.63	63.16	5.37	11.14
V Slight Gain	13	19.69	8.11	.14	.14	11.71	5.51	462.78	42.69	490.66	40.57	27.88	5.26
VI Case Study Classroom	1	27.	--	.00	--	10.00	--	432.57	--	666.76	--	234.19	--

gain group and the high pretest/moderate gain group might identify additional variables capable of explaining differences between the gain groups and the no-gain group. Accordingly, the mean scores of each group calculated during the analyses of variance were examined.

The case study has a gain of 234 points which clearly makes it an outlier. The no-gain group has an average of 22 students enrolled while the low pretest/high-gain group had an average of 26 students. The case study class, which gained the most, had the most students enrolled (27). Thus, class size per se does not account for class gain* nor does absence rate explain the difference in gain. The no-gain group has an average absence of 10 days; two of the gain groups had higher absence rates; the case study with highest gain has an average of 10 days' absence.

The group with the pretest test score change (Group I, low pretest/high gain) does not have heterogeneous classrooms, i.e., no students in these classrooms were performing above the 49th percentile on the pretest CTBS. Since the groups with homogeneous classes gained the most, this may be a factor in explaining the difference in gain scores.

Group I--low pretest/high gain. The four teachers who were able to take a group of low-performing students and assist them in improving their achievement by an average of 78 points deserve special study. The processes those four teachers were using that were different from the processes used in the no-gain classrooms are of great interest.

With the difference in group size (seven classrooms in the no-gain group and four classrooms in the low pretest/high-gain group), the statistical test of difference in the means may not identify all of the meaningful differences between the processes used by teachers in the two groups. Therefore, Table 21, which compares the two groups, includes variables which are statistically significant as well as variables that occur in one group but not in the other group, even though significant difference is not indicated. Variables that are educationally meaningful and illustrate classroom organization and interaction patterns are included for descriptive purposes.

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*The number of classroom aides and the ratio of students to adults is not taken into account here.

In the low pretest/high gain group, students read aloud with their teachers more frequently from textbooks than in the no-gain students. In fact, FMI Variable 54 (student reading aloud) indicates that the low pretest/high-gain group read aloud twice as often as the no-gain group. These students also read silently from their workbooks more often. Teachers of the low pretest/high-gain group more frequently provided instruction using the textbooks and workbooks. These teachers more often worked with the students on their written assignments, moved around the room, helped students evaluate their work, and gave them quizzes.

Teachers in the no-gain classrooms more often used the chalkboard during instruction, had discussion about the text, and performed drill and practice activities. The no-gain teachers more frequently gave verbal assignments for workbooks and the students perfomed these assignments alone, while the teacher graded papers or did other classroom management activities. Rosenshine (1977) summarized the time students spend alone and its efficiency. Current research from McDonald (1976) and Good (1978) indicates that students spend approximately 51% of their time doing seat work alone. Findings from McDonald (1976), Stallings and Kaskowitz (1974), and Stallings, Cory, Fairweather, and Needels (1978) show that unsupervised students are less academically engaged than supervised students. Therefore, teachers need to supervise the seat work to help students stay on task.

Students in the no-gain classrooms worked more often with reading kits, read from leisure reading books, did written assignments alone, and received instruction from a machine than students in the low pretest/high-gain group did. Students in the no-gain classrooms felt more affiliated with each other, made more social and humorous comments, had more positive and more negative interactions, and received more correction for behavior than did students in the low pretest/high gain classrooms. Anderson, Evertson, and Brophy (1978) found that classes with good peer relationships, i.e., more student interactions, had lower achievement.

Teachers from the low pretest/high-gain classrooms interacted with individual students 194 times, small groups 55 times, and the entire group 142 times. The no-gain classroom teachers interacted more frequently with individual students and less often with small groups or the entire class than did teachers of the low pretest/high gain group. Current research of Stallings and Kaskowitz (1974) and Stallings, Cory, Fairweather, and Needels (1978) shows that working with students on a one-to-one basis is not an efficient way to maximize the teaching time for each student. Evertson et al. (1977, Report No. 77-10) suggests that teachers should spend up to half their time with large groups or the total group. In the study presented here, the no-gain teachers were spending about two-thirds of their time with individual students.

The nature of the interactions for the two groups was similar in the number of reading interactions and task-related statements, although they occurred slightly more often in the low pretest/high gain group. The no-gain group had nearly four times as many interactions regarding behavior as the low pretest/high-gain group.

In summary, teachers in the low pretest/high-gain group seemed to have several activities going on in their classrooms during the class period. The students receive verbal instruction on their task and workbooks.

Table 21

MEANS AND STANDARD DEVIATIONS
FOR GROUP I--LOW PRETEST/HIGH GAIN AND GROUP IV--NO GAIN

Variable Number	Description	Group I (N=4 Classrooms)		Group IV (N=7 Classrooms)	
		$\bar{X}$	SD	$\bar{X}$	SD
	Affiliation	2.37	.31	3.08	.58
Snapshot					
TBM1	Read aloud--textbook	8.54	10.34	2.94	7.79
TBM2	Read aloud--workbook	--	--	1.88	4.98
TCM2	Make assignments with workbook	--	—	2.72	4.91
TCM9	Make assignments with no material	3.99	5.55	1.66	4.38
TDM1	Instructing, with textbook	3.07	3.55	0.87	2.31
TDM2	Instructing, with workbook	8.14	9.46	5.89	6.74
TDM7	Instructing, with chalkboard	—	—	2.87	7.60
TEM1	Discussion, with textbook	—	--	4.83	12.77
TFM2	Drilling, with workbook	--	—	7.73	20.30
TGM2	Written assignments, with workbook	10.75	8.62	4.59	5.95
THM2	Evaluation, with workbook	5.61	11.23	1.34	2.29
TIM3	Giving test, quiz, with textbook	5.18	10.36	1.08	2.86
TLM9	Managing classroom, with no material	1.17	2.33	6.71	4.99
TMM9	Transition, with no material	3.22	3.72	0.99	2.61
TPM3	Disciplining, with test	—	--	1.08	2.86
IAM1	Silent reading with textbook	1.27	2.54	0.19	0.50
IAM2	Silent reading with workbook	2.73	3.16	—	—
IAM8	Reading aloud--leisure	--	--	2.28	4.13
IGM2	Written assignments with workbook	4.84	8.58	13.21	14.97
IGM5	Written assignments with reading kit	--	—	7.95	14.04
ILM3	Classroom management, with test	3.31	6.62	—	—
IKM9	Social interaction, with no material	--	--	1.07	1.46
FMI					
5	Adults--interaction with individuals	193.50	66.22	288.29	74.12
6	Adults--interaction with entire group	55.50	38.69	33.00	49.93
7	Adults—interaction with entire class	141.75	112.74	114.86	80.08
54	Student reading aloud	121.00	156.92	60.57	82.72
56	All adult instruction, nontask	1.25	2.50	22.57	36.17
63	Instructions from a machine	--	--	48.14	82.26
74	Adult acknowledges students for reading	7.25	4.19	22.14	20.70
88	Adult gives corrective feedback by probing, task, or reading	2.75	1.71	11.00	11.02
91	Adult gives corrective feedback by task or reading	9.00	5.60	37.57	15.24
92	Adult gives negative corrective feedback for task or reading	--	--	0.43	0.79
94	Adult gives negative corrective feedback for behavior	--	—	8.14	13.98
96	Student not responding to adult, task or reading	--	--	3.43	2.94
106	Adult movement while interacting with students	60.00	35.41	43.71	31.94
111	All classroom interactions related to reading	663.50	61.39	639.29	120.87
112	All classroom interactions, related to task	43.75	55.88	16.29	31.99
113	All classroom interactions related to student behavior	18.00	22.21	63.00	79.51
124	All humorous interactions	--	--	1.00	1.15
125	All positive or humorous interactions	29.50	25.68	42.29	29.70
126	Adult offers students a choice of materials or activities	--	--	0.29	0.76
129	Students comment to adult regarding classroom assignment	10.75	5.68	3.86	3.67
133	Student does not know answer; adult guides student	--	--	0.43	0.79
139	Student response unacceptable, adult tells student answer	0.25	0.50	1.86	1.35

The teachers read aloud with the students, students read silently in workbooks, teachers monitored the seat work, moved around the classroom, helped students with assignments, provided evaluation and feedback. These teachers also quizzed their students more frequently than did all other groups of teachers.

Group II--moderate pretest/moderate gain. The seven teachers in this group averaged about the same number of students in their classrooms as did the seven teachers in the no-gain group. Both groups had some heterogeneous grouping, but students in this group averaged 5 days more absent than the no-gain students (see Table 20).

The students in this group rated their classrooms higher on task-orientation, order and organization, and enjoyment than all other groups (Table 22). These students never read aloud from textbooks and seldom from workbooks. They read silently from workbooks and leisure books and worked on written assignments more frequently than all other groups of students.

The teachers in this group instructed their students using audiovisual equipment more often than the no-gain teachers. In general, they provided more instruction and feedback or evaluation of students' written assignments in workbooks. They offered more statements about assignments and organization procedure than did teachers in all other groups (Var. 144).

Compared with those in the no-gain classrooms, these teachers less often directed their communication toward individual students or small groups, and more often toward the total class. More of the interactions concerned reading. They had fewer interactions about other tasks or behavior than all other groups.

MEANS AND STANDARD DEVIATIONS
FOR GROUP II--MODERATE GAIN AND GROUP IV--NO GAIN

TABLE 22

Variable Number	Description	Group II (N=7 Classrooms)		Group IV (N=7 Classrooms)	
		X̄	SD	X̄	SD
	Affiliation	2.44	0.53	3.08	0.58
	Task orientation	3.25	0.34	2.61	0.79
	Order and organization	2.34	0.93	1.48	0.89
	Enjoy class	4.05	0.34	3.59	0.64
Snapshot					
TBM1	Read aloud--textbook	—	—	2.94	7.79
TBM2	Read aloud--workbook	2.71	7.16	1.88	4.98
TCM2	Make assignments with workbook	0.98	2.59	2.72	4.91
TDM6	Instructing with audiovisual equipment	6.37	11.06	2.00	5.29
TDM9	Instruction with no material	3.17	3.99	—	—
TFM2	Drilling with workbook	1.01	2.67	7.73	20.30
THM2	Evaluation with workbook	3.19	6.37	1.34	2.29
TLM9	Managing classroom with no material	1.82	3.11	6.71	4.99
TPM3	Disciplining with test	—	—	1.08	2.86
IAM1	Silent reading with textbook	—	—	0.19	0.50
IAM2	Silent reading with workbook	4.28	4.98	—	—
IAM8	Reading aloud—leisure	6.38	12.31	2.28	4.13
IFM2	Drilling with workbook	—	—	2.26	5.98
IGM2	Written assignment with workbook	25.11	17.14	13.21	14.97
IGM5	Written assignment with reading kit	1.63	3.71	7.95	14.04
IKM9	Social interaction with no material	0.28	0.49	1.07	1.46
IOM9	Uninvolved with no material	—	—	0.45	0.77
FMI					
5	Adults—interaction with individuals	249.86	65.39	288.29	74.12
6	Adults—interaction with entire group	8.14	8.97	33.00	49.93
7	Adults—interaction with entire class	162.00	89.97	114.86	80.03
8	Student asks direct questions about task or reading	23.29	10.86	56.71	34.82
9	Student asks direct questions about reading only	22.71	11.28	54.00	30.40
11	All students ask direct questions	25.14	12.19	62.71	35.42
32	Student complies with behavioral correction or reinforcement	3.14	5.43	14.43	13.05
34	Student responds to adult command, request or direct question; task or reading	75.86	17.30	61.00	25.46
57	All adult instruction, reading	240.14	114.55	172.86	75.28
64	Student presents information to group, reading	4.86	8.78	—	—
74	Adult acknowledges students for reading	27.43	11.16	22.14	20.70
87	All adult praise and support	40.43	10.94	32.14	22.98
91	Adult gives corrective feedback by task or reading	46.29	16.40	37.57	15.24
93	Adult gives corrective feedback for behavior	5.43	6.79	34.43	46.45
94	Adult gives negative corrective feedback for behavior	0.14	0.38	8.14	13.98
106	Adult movement while interacting with students	45.00	48.96	43.71	31.94
111	All classroom interactions related to reading	650.00	128.60	639.29	120.87
112	All classroom interactions, related to task	10.00	19.11	16.29	31.99
113	All classroom interactions related to student behavior	10.57	15.98	63.00	79.51
116	All positive interactions	15.57	19.47	20.14	14.58
119	All negative interactions	0.86	1.57	25.71	43.40
124	All humorous interactions	0.86	2.27	1.00	1.15
131	Student does not answer, adult gives corrective feedback, probe	2.57	2.70	0.43	0.53
138	Student response unacceptable, adult rephrases question	3.29	2.36	1.43	1.40
139	Student response unacceptable, adult tells student answer	2.43	2.88	1.86	1.35
144	All interaction involve with organization or assignments	170.00	104.18	152.00	91.00
156	Adult acknowledges student response to direct questions	15.00	7.21	10.29	13.77
160	All adult interactions with intruder	4.00	4.62	8.71	7.52
161	Adult begins interaction with a different student	94.14	48.61	72.00	35.96
162	Different student starts interaction with adult	30.86	14.29	76.86	28.49

Students in the moderate pretest/moderate gain-group seldom initiated questions or comments. They more often responded to the teacher's questions and received acknowledgment and praise for reading work. They also received more corrective feedback for reading work. If one student's answer was not correct, the teacher may have told the answer or quickly asked another student to answer. Several feedback techniques were used. If a student said, "I don't know," the teacher was likely to ask the student more probing questions. For all of the question, response, and feedback reading variables, the teachers in the moderate pretest/moderate-gain group were rated highest. This type of classroom interaction fits rather nicely into Rosenshine's (1977) description of direct instruction:

> To give an overview of the results, direct instruction refers to high levels of student engagement within teacher-directed classrooms using sequenced, structured materials. As developed below, direct instruction refers to teaching activities focused on academic matters where goals are clear to students; time allocated for instruction is sufficient and continuous; content coverage is extensive, student performance is monitored; questions are at a low cognitive level and produce many correct responses; and feedback to students is immediate and academically oriented. In direct instruction, the teacher controls instructional goals, chooses material appropriate for the student's ability level, and paces the instructional episode. Interaction is characterized as structured, but not authoritarian; rather, learning takes place in a convivial academic atmosphere. (p. 9a)

By comparison, the no-gain classrooms were more social. The students rated them higher on affiliation; they made more positive, negative, and humorous comments; they received more correction for behavior. The teachers spent about as much time in grading papers or management tasks as in drill and practice activities. They provided about two-thirds as much reading instruction as did teachers of the moderate pretest/moderate-gain group.

In summary, teachers in the moderate pretest/moderate-gain group seemed to provide reading instruction to the total group. Students did written assignments in workbooks or read in leisure books. Students received evaluation of their work. Teachers asked questions; students responded and received feedback. The classrooms appeared to be on-task with very little misbehavior occurring.

Group III--high pretest/moderate gain. Four teachers had students who entered with very high scores and made moderate gains. Students in these classrooms were more heterogeneously grouped than in the no-gain classrooms. They had, on the average, a few more students than the no-gain classrooms, but the students in this group were absent less often (see Table 20).

The most characteristic thing about the high pretest/moderate-gain group is that subjects other than reading were being taught (see Table 23). Any subject matter other than reading was coded as "task." For the most part, this included social studies and some science. The teachers were teaching reading within the subject area. Thus we see teachers and students asking more task questions (Variables 20 and 29) in this group and having more task interactions (Variable 112) than in other groups.

The students did read aloud from textbooks, perhaps social studies, read silently from reading kits and infrequently from leisure books. They played nonreading but task-type games such as social studies simulation games.

The teachers instructed the students using textbooks and audiovisual equipment more frequently than teachers of the no-gain group. They did not make assignments in workbooks, but they did assign work in reading kits. They spent some time managing--grading papers and the like--but did not quiz the students during the period of observation.

The teachers focused their communication more toward the total group than toward the individual or small group. If the teachers started an interaction with a student, they were most likely to complete the

Table 23

MEANS AND STANDARD DEVIATIONS FOR GROUP III--HIGH PRETEST/MODERATE GAIN AND GROUP IV--NO GAIN

Variable Number	Description	Group III (N=4 Classrooms)		Group IV (N=7 Classrooms)	
		$\bar{X}$	SD	$\bar{X}$	SD
	Task orientation	3.07	.31	2.61	.79
Snapshot					
TBM1	Read aloud--textbook	7.69	15.38	2.94	7.79
TBM2	Read aloud--workbook	—	—	2.72	4.91
TDM1	Instructing with textbook	7.50	10.52	.87	2.31
TDM6	Instructing with audiovisual equipment	9.88	19.76	2.00	5.29
TDM7	Instructing with chalkboard	—	—	2.87	7.60
TFM2	Drilling with workbook	—	—	7.73	20.30
TGM5	Written assignment with game or manipulative materials	4.01	8.02	1.27	3.35
TIM3	Giving test, quiz with textbook	—	—	1.08	2.86
TLM9	Managing classroom with no material	3.73	4.31	6.71	4.99
TPM3	Disciplining with test	—	—	1.08	2.86
IAM5	Reading silently with reading kit	5.62	11.23	3.17	8.38
IAM8	Reading aloud--leisure	.53	1.07	21.28	4.13
IJM4	Nonreading learning with game or manipulative materials	5.58	11.16	—	—
FMI					
5	Adults--interactions with individuals	175.75	46.51	288.29	74.12
6	Adults--interactions with entire group	50.75	87.55	33.00	49.93
7	Adults--interactions with entire class	195.25	106.30	114.85	80.00
10	Student asks direct questions about task	17.50	26.89	2.71	6.75
20	Teacher asks questions about task	25.75	39.45	1.00	1.15
29	Student responds to an adult about reading	54.25	38.37	87.71	30.07
32	Student complies with behavioral correction or reinforcement	7.25	4.57	14.43	13.05
56	All adult instruction, nontask	4.00	2.83	22.57	36.17
57	All adult instruction, reading	113.75	103.66	172.86	75.28
58	All adult instruction, task	211.25	127.34	175.14	78.81
61	Adult instructs small group, task or reading	36.50	72.33	14.28	35.62
62	Adult instructs entire class, task or reading	138.00	95.93	66.14	55.18
69	All social comments	26.25	31.31	16.85	15.00
93	Adult gives corrective feedback for behavior	10.25	6.75	34.43	46.44
109	All adult listening to student	26.50	26.44	15.28	26.16
110	All adult observing student	45.25	48.29	17.57	19.26
111	All classroom interactions related to reading	492.25	316.90	639.29	120.87
112	All classroom interactions related to task	215.25	312.55	16.29	31.99
113	All classroom interactions related to student behavior	24.00	10.98	63.00	79.51
119	All negative interactions	2.50	3.00	25.71	43.40
120	All warm supportive interactions	2.50	2.65	9.57	9.41
124	All humorous interactions	8.00	12.19	1.00	1.15
129	Student comments to adult regarding classroom assignment	8.00	6.06	3.86	3.67
160	All adult interaction with intruder	8.25	7.41	8.71	7.52
161	Adult begins interaction with a different student	53.75	24.86	72.00	35.96
162	Different student starts interaction with adult	80.50	38.21	76.86	28.49

interaction than to switch to a different student (Var. 161). These teachers also more often listened to students and observed them than did teachers of the other groups.

Although social comments (Var. 69) were made at a higher rate and more humor was expressed (Var. 124) in the classrooms of this group, there was very little misbehavior (Var. 32, 93) and very few negative interactions (Var. 116). These findings are similar to those reported for the high SES group in the Brophy and Evertson (1978) Texas Jr. High School Study.

These teachers were interrupted by intruders as much as were the no-gain teachers (Var. 160). Perhaps the scores of their students would have been higher if there were fewer interruptions. We did find that, overall, intrusions had a negative relationship with gain in reading.

An analysis of the test scores indicates that each of the four classrooms in this group was heterogeneously grouped. One-fourth to one-half of the students in the classes scored over the 49th percentile on their pretest. We removed these high-scoring students from the sample to see whether their gain represented a disproportionate gain for the class; it did not. In fact, in all classes, the mean gain score went up when these higher-pretest students were removed (see Table 24). This finding suggests either that the students came near the ceiling of the test and could gain very little more or that higher-scoring students may not continue to accelerate their growth in heterogeneously grouped classrooms.

Group V--slight gain. The 13 classrooms that had very slight gain were separated from the 7 no-gain classrooms. Analysis of the differences in the processes used in the two groups indicated that teachers in the slight-gain group spent less time in management tasks, such as grading papers, during class time (Var. TLM9) than did no-gain teachers. They also spent less time socializing (Var. IKM9, 40, 69).

Table 24

GROUP III--HIGH PRETEST/MODERATE GAIN WITH AND WITHOUT HIGH-SCORING STUDENTS

	Gain	
Class	With Students Over 49th Percentile	Without Students Over 49th Percentile
114	54	58
142	88	99
612	35	50
621	19	41

The students in the slight-gain group demonstrated less negative behavior, less humor, and received less negative feedback than did students in the no-gain group. Students in the slight-gain group less often made unacceptable responses to teacher requests, less often said they did not like the assignment, and less often had different students interrupt the teacher (Var. 137, 140, 162).

On a continuum of variables from no-gain to high-gain, the slight-gain group falls in place. All of the variables that are negatively related to achievement occur infrequently in the high-gain group, occur more frequently in the slight-gain group, and most frequently in the no-gain group.

Group VI--case study classroom. The case study provides an interesting contrast for the classes that started with high pretest and made moderate gains. This class gained over 200 standard score points. They entered at a moderate level within the Group II range and achieved higher scores than any of the Group III classrooms. The case study group had more students enrolled than most groups. The students were similar in their initial competence, i.e., none scored over the 49th percentile on the pretest. (See Table 20).

All 27 students gave their teacher top rating for fairness and enjoyment of the class. They also gave higher ratings for teacher support, order and organization, professionalism, and individual attention than students in other groups gave their teachers.

The most outstanding feature of the case study is that it scored higher than all other groups by over 100 points on the number of reading interactions occurring in the classroom. This indicates that the teacher and students were involved with the reading task more often than all other classes were. See Table 25 for the case study classroom means of process variables.

The students in the case study read aloud from workbooks more frequently than students in all other classrooms (Var. TBM2, IBM2, 54) and did written assignments in workbooks about as frequently as students in the moderate pretest/moderate gain group.

More frequently than all other tasks, the teacher discussed assignments and instructed the students in reading using a chalkboard (Var. TDM9) or no materials. As in the other groups, the teacher directed interactions to individual students more often than to small groups or the entire class; the pattern of this communication is similar to the moderate pretest/moderate gain group. The pattern of the teacher providing instruction in reading asking a question about reading, students responding and receiving praise occurred more frequently in this classroom than in all others (Var. 19, 29, 57, 81). The teacher seems to have called on specific students, one after the other, to respond, for there were very few volunteers who responded or different students who initiated interactions (Var. 39, 162). The pattern was similar in the moderate pretest/moderate gain group, but it occurred more frequently in the case study classroom.

The teacher in the case study classroom made many comments about the assignments while the students made none at all (Var. 128, 129). The students were well-behaved: There was no negative behavior or refusal to comply with the teacher's request, nor were any students sent from the classroom. Although no humor was recorded in the case study classroom, more positive behavior was recorded than in any other group (Var. 116, 123).

Table 25

MEANS FOR GROUP VI--CASE STUDY

Variable Number	Description	$\overline{X}$
Snapshot		
TBM2	Read aloud--workbook	19
TDM7	Instructing with overhead chalkboard	14
TDM9	Instructing with no material	6
TEM9	Discussion with no material	7
IBM2	Student reading aloud with workbook	6
IGM2	Student doing written assignment with workbook	19
FMI		
5	Adult interactions with individuals	243
6	Adult interactions with entire group	31
7	Adult interactions with entire class	195
9	Student asks direct questions about reading	22
19	Adult commands, requests, and directs questions to students about reading	118
29	Student responds to an adult about reading	101
39	Student voluntarily responds to all adult questions about task or reading	3
42	Adult responds to student requests or questions about reading	20
47	Adult responds to student questions or requests with a direct question or request about task or reading	1
54	Student reading aloud	168
57	All adult instruction, reading	243
61	Adult instructs small group, task or reading	18
62	Adult instructs entire class, task or reading	113
69	All social comments	24
74	Adult acknowledges students about reading	27
81	Adult praises students about reading	8
88	Adult gives corrective feedback by probing, task or reading	4
89	Adult gives corrective feedback by giving correct answer, task or reading	4
91	Adult corrective feedback, task or reading	8
92	Adult gives negative corrective feedback for task or reading	0
93	Adult gives corrective feedback for behavior	11
96	Student not responding to adult, task or reading	2
103	All students refusal to comply with adult request	0
105	All adult noninteracting with students, nonverbal	21

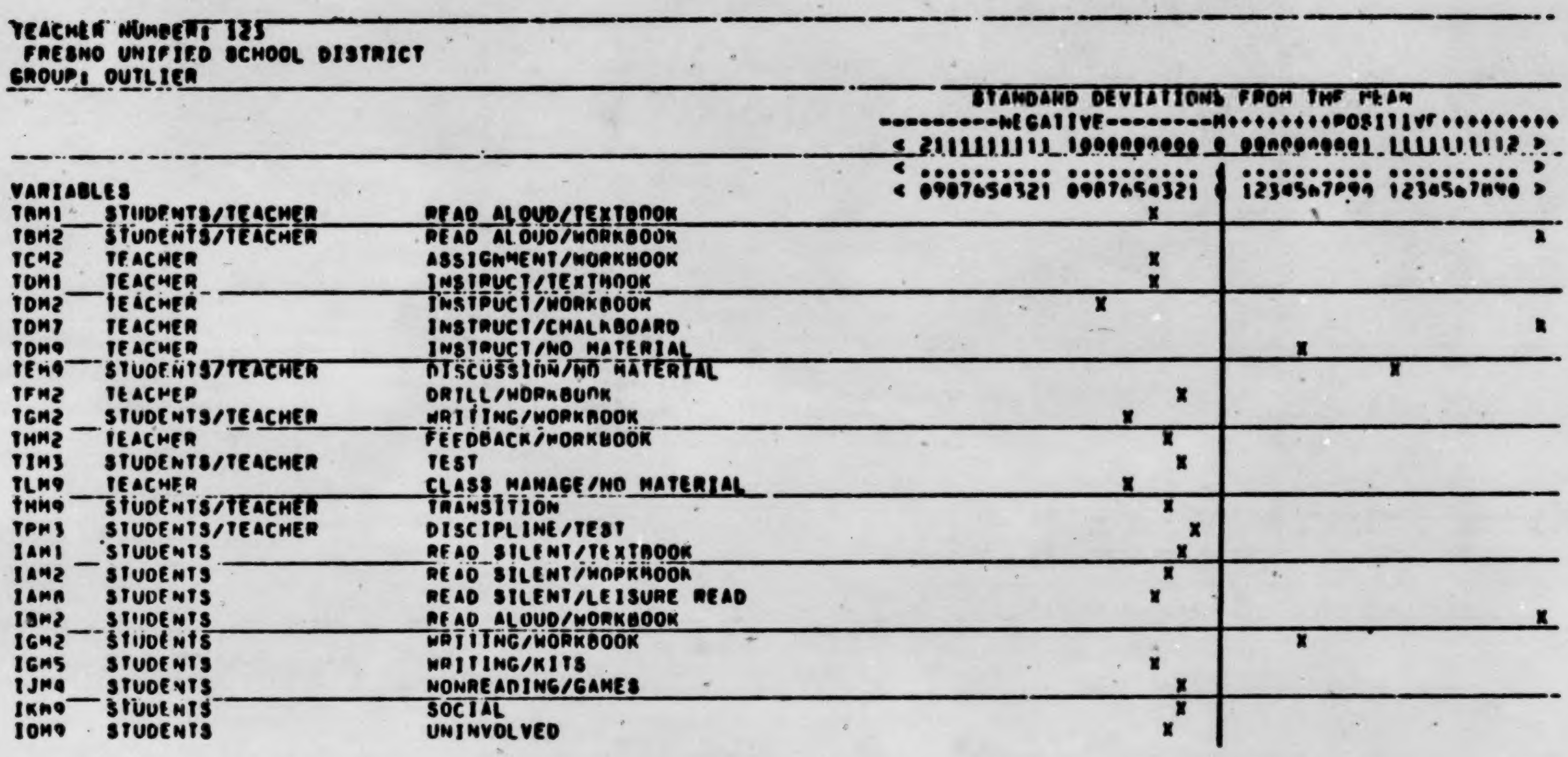
(Concluded)

Variable Number	Description	$\bar{X}$
FMI		
106	Adult movement while interacting with students	47
109	All adult listening to student	22
110	All adult observing student	0
111	All classroom interactions related to reading	791
116	All positive interactions	60
119	All negative interactions	0
121	Student being sent from classroom for disciplinary reason	0
123	All student humorous interactions	0
128	Adult comments to students regarding classroom assignment	68
129	Student comment to adult regarding classroom assignment	0
161	Adult begins interaction with a different student	82
162	Different student starts interaction with adult	32

The case study teacher used methods similar to those which were found to be efficient in the low pretest/high gain group, e.g., reading aloud. This teacher also used methods like those of the moderate pretest/moderate-gain teachers, who had students that entered with moderate test scores similar to those of students entering the case study classroom. Variables distinguishing the moderate pretest/moderate-gain group are the direct teaching variables (teacher asks a question, student responds, and teacher provides feedback); the case study classroom used this pattern even more frequently. As in the low pretest/high-gain group and the moderate pretest/moderate gain group, the case study students were rarely off-task; they exhibited very little misbehavior. Thus, efficient methods highlighted by both the low pretest/high-gain group and the moderate pretest/moderate gain group were used by the case study teacher. Group III, the high pretest/moderate-gain group, was distinguished by its use of other subject areas as a vehicle for reading; the case study teacher did not use that method (see Table 25).

Teacher profiles. Having identified a set of 50 process variables that are related to achievement in reading and to absence rate, we prepared a profile for each teacher on that set of variables. The 50 variables were standardized, and the individual teacher's standardized raw score was plotted against the standardized mean score for all 43 classes in units of 0.1 standard deviation. The profile for Teacher 123, the case study, is presented in Figures 9 and 10. The mean for all teachers is indicated by the line down the middle of the figures.

The amount of recorded observed teacher behavior for each variable is compared to the mean. In this case, the teacher is higher than the mean on variable TBM2, students reading aloud from workbooks, and below the mean on students uninvolved (Figure 9). In Figure 10 we can see that this teacher is higher than the mean on positive behavior and lower on negative behavior.



```
TEACHER NUMBER: 125
 FRESNO UNIFIED SCHOOL DISTRICT
GROUP: OUTLIER
                                                                       STANDARD DEVIATIONS FROM THE MEAN
                                                                 ---------NEGATIVE---------M+++++++++POSITIVE+++++++++
                                                                  < 2111111111 1000000000 0 0000000001 1111111112 >
                                                                  < .......... ..........   .......... .......... >
VARIABLES                                                         < 0987654321 0987654321 0 1234567890 1234567890 >
TAM1   STUDENTS/TEACHER        READ ALOUD/TEXTBOOK                                   X
TBM2   STUDENTS/TEACHER        READ ALOUD/WORKBOOK                                                               X
TCM2   TEACHER                 ASSIGNMENT/WORKBOOK                                   X
TDM1   TEACHER                 INSTRUCT/TEXTBOOK                                     X
TDM2   TEACHER                 INSTRUCT/WORKBOOK                                 X
TDM7   TEACHER                 INSTRUCT/CHALKBOARD                                                               X
TDM9   TEACHER                 INSTRUCT/NO MATERIAL                                             X
TEM9   STUDENTS/TEACHER        DISCUSSION/NO MATERIAL                                                  X
TFM2   TEACHER                 DRILL/WORKBOOK                                          X
TGM2   STUDENTS/TEACHER        WRITING/WORKBOOK                                    X
THM2   TEACHER                 FEEDBACK/WORKBOOK                                      X
TIM3   STUDENTS/TEACHER        TEST                                                    X
TLM9   TEACHER                 CLASS MANAGE/NO MATERIAL                            X
TMM9   STUDENTS/TEACHER        TRANSITION                                             X
TPM3   STUDENTS/TEACHER        DISCIPLINE/TEST                                          X
IAM1   STUDENTS                READ SILENT/TEXTBOOK                                    X
IAM2   STUDENTS                READ SILENT/WORKBOOK                                   X
IAM8   STUDENTS                READ SILENT/LEISURE READ                              X
IBM2   STUDENTS                READ ALOUD/WORKBOOK                                                               X
IGM2   STUDENTS                WRITING/WORKBOOK                                                 X
IGM5   STUDENTS                WRITING/KITS                                          X
IJM8   STUDENTS                NONREADING/GAMES                                        X
IKM9   STUDENTS                SOCIAL                                                  X
IOM9   STUDENTS                UNINVOLVED                                             X
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Figure 9. Basic Skills teacher profile—Snapshot.

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                                         BASIC SKILLS TEACHER PROFILE
                                           FIVE MINUTE INTERACTION

TEACHER NUMBER: 123
 FRESNO UNIFIED SCHOOL DISTRICT
GROUP: OUTLIER
                                                                        STANDARD DEVIATIONS FROM THE MEAN
                                                                 ---------NEGATIVE--------M+++++++++POSITIVE++++++++
                                                                  < 2111111111 1000000000 0 0000000001 1111111112 >
                                                                  < .......... .......... . .......... .......... >
VARIABLES                                                         < 0987654321 0987654321 0 1234567890 1234567890 >
FMI005 ADULT TO STUDENT        VERBAL                                                   X
FMI006 ADULT TO GROUP          VERBAL                                                       X
FMI007 ADULT TO CLASS          VERBAL                                                           X
FMI008 STUDENTS                DIRECT QUESTIONS,TASK OR READING                   X
FMI019 ADULT                   DIRECT QUESTIONS,READING                                       X
FMI029 STUDENT                 RESPONSE,READING                                             X
FMI054 STUDENT                 READ ALOUD                                                                X
FMI057 ADULT                   INSTRUCTION,READING                                                X
FMI063 MACHINE                 INSTRUCTING STUDENTS                                   X
FMI086 ADULT                   PRAISE/SUPPORT,TASK/READ                                   X
FMI090 ADULT                   FEEDBACK/GUIDANCE,TASK/READ                        X
FMI091 ADULT                   CORRECTIVE FEEDBACK,TASK/READ                    X
FMI111 ALL INTERACTIONS        READING                                                            X
FMI112 ALL INTERACTIONS        TASK                                                  X
FMI116 ALL INTERACTIONS        POSITIVE BEHAVIOR                                                                X
FMI119 ALL INTERACTIONS        NEGATIVE BEHAVIOR                                      X
FMI124 ALL INTERACTIONS        HUMOR                                                      X
FMI126 ADULT                   OFFERS CHOICE,ACTIVITY                                 X
FMI129 STUDENT                 COMMENTS,ASSIGNMENT                              X
FMI131 STUDENT/ADULT           STUDENT DON'T KNOW,ADULT PROBES                     X
FMI141 ADULT                   CLASSROOM ASSIGNMENTS                                            X
FMI143 ADULT                   CLASSROOM ORGANIZATION                                X
FMI156 ADULT/STUDENTS          ADULT ACKNOWLEDGE,STUDENT RESPONSE                     X
FMI160                         OUTSIDE INTRUSION                                  X
FMI161 ADULT/DIFFERENT STUDENT INTERACTIONS                                               X
FMI162 DIFFERENT STUDENT       STARTS INTERACTION                                 X
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Figure 10. Basic Skills teacher profile—Five-Minute Interaction.

Each teacher in Phase I of the study will receive such a profile and an explanation of the meanings of the variables during Phase II of the study.

Implications for Teachers

The results of this study provide some interesting recommendations for teaching reading in the secondary schools. By separating the classes according to the pretest reading levels of students, the recommendations to teachers can be specific for the level of students they receive. Interesting contrasts were found in the classroom processes of the six subgroups that were identified according to the pretest scores and the gains they made.

Overall, we have learned as much from these analyses about what teachers ought not to do as we have about what they should do. For efficiency in teaching basic skills in reading, these findings suggest that teachers should:

- Have most interactions about reading
- Give instructions to the total group
- Ask questions of specific students (no volunteers)
- Provide positive feedback
- Control negative behavior
- Encourage positive behavior
- Use guides and probing questions when students do not know the answer

Teachers should not:

- Grade papers during the class period
- Socialize or allow students to socialize
- Allow others to intrude and interrupt the class period
- Allow negative behavior
- Encourage humor during class time

In the past, many schools had well-defined "tracks" or "lanes." Once a student was assigned to the A, B, C, or D lane, the student usually stayed on that track for the entire school experience. Many educators and parents felt this practice was very restricting and demoralizing for the low achievers. To replace the program that assigned students to achievement lanes, many schools adopted a policy of grouping students so that some high, medium, and low achievers could be found in each class.

Theoretically, this sounds like a good practice, but in this study the classrooms that had students who were more like each other in reading achievement made more gain in reading. In heterogeneously grouped classrooms, the students who scored over the 49th percentile on the pretest made less gain than did students scoring below the 49th percentile on the pretest. Students in heterogeneously grouped classrooms spent more time making social comments and humorous statements, and spent less time on reading. Thus, our findings suggest that for greater efficiency in teaching and learning reading skills, students should be placed in classes with students of similar reading ability. This does not imply that classes in other subjects such as social studies, music, art, or science should be grouped by ability. We recommend that the rules followed by schools in placing students should be flexible and appropriate to the subject matter to be learned.

Phase II

Having identified several instructional processes that were efficient in teaching basic reading skills to secondary students, SRI staff proceeded to organize these findings into a series of inservice workshops.

Two additional school districts, San Jose and Tulare Union High School, requested that they take part in the study. Thus, for Phase II, our sample of students and teachers increased to 51 classrooms and 902 students.

The design was to test the students and observe the classrooms in the fall, winter, and spring. On the basis of fall test scores, teachers, by district and student achievement level, would be randomly placed in experimental or control groups. The winter observations would be conducted after the workshops to see whether the teachers were implementing the behaviors recommended in the workshops. In the spring, posttest data would be gathered to see whether students in the experimental teachers' classrooms gained more on the reading test than those in the control group.

The same instruments used in Phase I were used in Phase II, with one exception. A secondary comprehensive reading test was developed by SRI and substituted for the CTBS. For Phase I of the study, CTBS reading scores reported by each district were used as measures of reading achievement. However, use of data collected by the districts for state assessment necessitates waiting several months for test results. Because we needed immediate scores to select a matched sample of teachers for the treatment and control groups of Phase II, we decided to administer a reading test to all students in the study in the fall of 1977 and the spring of 1978. It was necessary to select a wide-range reading comprehension test because the achievement of students in the study varies as much as eight grade levels. A published test that could be administered to such diverse groups within one class period could not be located. Therefore a reading test based on the California Achievement Test (CAT) was developed at SRI. The CAT consists of five test levels. Items were selected from each level of the vocabulary and reading comprehension subtests. At the lower levels, the content of the items was modified to be more appropriate to secondary school students.*

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* We have since found these test scores to be correlated .98 with fall 1977 CTBS reading scores.

Assignment of teachers to groups. Based upon the fall student reading test data, teachers were assigned to either an experimental group to receive training immediately, or to a control group to receive training after spring data collection. Two criteria guided the selection of teachers for the groups. We wanted some teachers in the control group and some in the experimental group in each district. We also wanted an equal distribution of classrooms in the experimental and control groups by level of the entering reading ability of the students in the class (i.e., class mean score, low, medium, or high as defined in Phase I).

Workshops. The four workshops were conducted by two SRI staff members in Salinas, Monterey, Fresno, and Menlo Park. Two were held prior to the Christmas holidays and two were held in January. Teachers in each location could choose the time of day for the sessions. In all districts but Salinas, teachers chose hours after school.

The first workshop was organized around the observed profile of behaviors of individual teachers and the test scores of the students in the class (see Figure 9 and 10). The profiles were interpreted and recommendations for change in behavior were made on the basis of Phase I findings and in consideration of the students' levels of reading achievement. Many teachers had a wide range of student abilities in their class; therefore, they had to consider the recommended behaviors for more than one group. Each teacher received a packet of information with recommendations.

Because so many process variables studied in Phase I were negatively correlated with reading achievement, the second workshop provided specific recommendations for behavior management. Each teacher received a packet to read before the session. During the session, the leader asked teachers to identify the most difficult behavior problem they had had to handle the past week. In each of the separate sessions, the teachers eventually mentioned the same problems: tardiness, absenteeism, argument, shouting out demeaning remarks, and fights. The leaders asked how each teacher handled such situations. Some of these incidents were role played. Ways of handling such situations were suggested by the teachers and the trainers made recommendations based upon the data. Teachers role played some of these recommendations.

The third workshop offered specific suggestions for how to organize or structure the classroom. Since the students in many classrooms had a wide range of reading abilities, we recommended grouping according to reading disability for some of the reading activities. This recommendation was difficult for teachers to execute since little information was available to them about the reading problems of particular students. We suggested that teachers try to understand why each student had failed to achieve in reading and to select an appropriate approach for remediation. Armed with little more information than the CTBS provides regarding grade equivalency, many teachers felt unable to follow this suggestion. Our recommendations for grouping were difficult to facilitate in classrooms where the number of students was large and the classrooms were small. Further recommendations for arranging the desks or tables for groups and placing assignments on the chalkboard before class begins were impossible for those teachers who rotated from classroom to classroom. If a teacher must race the children to the room, there is little time to move the furniture or write assignments on the chalkboard.

Techniques for motivating students toward good behavior and achievement were also discussed in the third session. The teachers found these recommendations easier to implement since they did not involve the rearrangement of furniture and students.

The fourth workshop synthesized the activities of the first three. It dealt with the direct approach to teaching. This method requires that teachers be in charge of their classrooms at all times, that they diagnose reading problems, select appropriate sequential materials, and provide frequent, supportive feedback. Since this methodology includes motivation techniques, we will incorporate the motivation section from Workshop 3 into this workshop.

For all workshop sessions, the SRI trainers made an effort to create an atmosphere that fostered uninhibited participation by the teachers. The workshops were well attended and the teachers expressed appreciation for the opportunity to discuss their problems freely and to receive specific suggestions for methods to improve their effectiveness in the classroom.

Some surprising findings came from the teachers during the workshops. They provided many anecdotal situations describing the problems they confront as reading teachers. Based upon their suggestions, we prepared a survey of teacher training, teaching experience, room assignments, class size, and student ratio. We found that only 21% of the secondary teachers who have been assigned to teaching basic reading classes have been specifically trained to teach reading (see Table 26). Most are trained to teach music, arts, speech, psychology, physical education, typing, English, literature, drama, Spanish, theology, science, and career education (see Table 27). Of the 47 teachers responding to the survey, 34 continue to teach classes other than reading. Teaching experience varies from 1 year to 31 years. This is the first year of teaching reading for 11 teachers, while 7 have been teaching reading 10 or more years. All the teachers in our sample assigned to teach reading are very willing but they feel inadequately prepared. Many seek additional training. Workshops for teaching reading have been attended by 53%, and 49% have taken some college courses. Teachers report that the reading workshops and courses they have taken vary in usefulness from excellent to a waste of time. There is a wide variety of programs being offered for inservice workshops, but few guidelines are available for districts or teachers to help them know what is needed to help teachers learn to teach reading at the secondary level.

Table 26

SUMMARY OF TRAINING AND EXPERIENCE

(n = 47 teachers)

Type of Training	Percent of Teachers
Speciality in teaching reading	21.3%
Attend workshops	53.2
Take college courses	48.9
Elementary credential	19.1
No formal training to teach reading	34.0
Also teach other subjects	72.3

Experience	Range
Total years teaching	1-31 years
Years teaching reading	1-12 years

Table 27

CREDENTIALS FOR TEACHING BY SUBJECT AREA

Credentialled Subject	No. of Teachers
Reading	10
Literature	5
Writing	3
Grammar	2
Language Arts	4
Speech	3
English	24
Spanish	2
Theology	1
Music	3
Drama	4
Art	3
Career education	1
Commerce	1
Business	1
Physical education	4
Aviation	1
Ethnic studies	1
Social studies	16
History	12
Political science	1
Psychology	2
Life science	2
Biological and physical sciences	2
Math	1
State requirements	1

Table 28

CLASSROOM ENVIRONMENT

(n = 47 teachers)

Description	Percent of Teachers
Have adequate room size	85.1%
Have no assigned room	28.0
Share a room	48.9
Have an aide present	57.4

	Average	Range
Class size	20	7 - 33
Ratio of students to adults	17:1	5:1 - 33:1

A fundamental problem seems to be the absence of any program for diagnosing learning problems at the secondary level. Most elementary school children are screened for sight or hearing problems, or dyslexia, and special programs are arranged for the children. If junior and senior high school students are still performing at a second, third, or fourth grade reading level, then some excellent information should be available that describes each student's difficulties in hearing, sight, or perception, as well as specific deficits in reading skills. However, secondary students are rarely tested. Thus, students who have failed previously when using standard curricula often continue to fail using the same curricula. Diagnostic and prescriptive skills are badly needed by teachers. Limited school budgets have cut the time available for school psychologists or counselors to provide such services.

Another problem teachers report is that many schools are organized so that teachers do not have their own rooms. Of the reading teachers, 49% share rooms, and 28% rotate from room to room (see Table 28). Several teachers report being in six different rooms during the day. This makes it very difficult to establish a reading environment where students can see their progress charted or where teachers can have appropriate reading or testing materials close at hand. In this situation, the teacher must place all of the materials on a cart and move from class to class. One teacher has to go down two flights of stairs with the cart.

Class size, although it was not found to be directly correlated with reading gain, affects the ability of the teacher to work with different groups of students while maintaining order. The 2 teachers who have 10 or fewer low-reading-level students are more likely to meet the student/staff ratio in some cases, but of the 47 teachers responding to the survey, 20 do not have classroom aides. The ratio of students to adults ranges from 5/1 to 33/1.

Follow-up workshop. Observations were conducted again in February 1978 to see whether recommendations from the workshops were being followed. New profiles were prepared for each teacher in the form of transparencies, so that the winter profile could be laid over the fall profile to see whether the teacher's behavior had changed. Workshops based on these data are being conducted. The teachers are enthusiastic about this personalized feedback. At first glance, it seems that the experimental group of teachers have reduced the negative behavior in their classrooms and have increased the positive feedback. The amount of reading aloud has increased in classrooms with low-reading-ability students. These data will, of course, be more thoroughly analyzed and reported in the final Phase II report, which will include the data collected in spring 1978.

Recommendations

Based upon our research findings and teacher reports, we suggest several corrective measures that could be taken by school districts to improve the morale of reading teachers and increase their efficiency in teaching basic reading skills to secondary students:

- Provide inservice training to help teachers learn to organize and manage reading classes. Working with several small groups of students at similar ability levels is more efficient than working with one student at a time.
- Provide information regarding efficient strategies to use the different levels of reading.
- Provide inservice training to assist teachers to cope with and change the disruptive behavior and low morale of students who have a long history of failure.
- Provide inservice training to diagnose learning problems and select appropriate reading materials. Handing a curriculum guide to teachers who are untrained in reading methods is not enough.

- Assign rooms so that reading teachers can have diagnostic and criterion-test materials, and a wide range of high-interest reading materials available as needed.
- Arrange the size of remedial reading classes to be related to the severity of the reading difficulties. Teachers who have students functioning at a very low level should have fewer students.

Phase II of the study was guided by the work of Nate Gage and John Crawford in the Stanford Experiment on Teacher Effectiveness. These researchers took the findings from four correlational studies and translated them into inservice teacher training strategies for use in third-grade classrooms. These strategies included (1) Instructional Method, (2) Behavior Management and Classroom Discipline, (3) Questioning Pupils and Providing Feedback. An experimental design was executed to see whether the training was effective. They did find some positive training effect.

Tom Good (1978) also carried out an experiment with fourth-grade math teachers. Based upon prior research findings, these researchers gave the teachers specific instruction on how to improve student math achievement by providing daily reviews, development, seatwork, homework assignments and special reviews. At the conclusion of the experiment, the experimental group had made significantly more gains than the control group, confirming our findings that teachers can learn to teach more effectively.

Other experimental studies conducted in natural classrooms are needed to examine the utility of correlation research findings. Such studies can guide not only inservice teacher training but preservice training as well.

VII. OTHER STUDIES

Factors Influencing Women's Decisions to Enroll in Elective Mathematics Classes in High School

SRI has been funded by the National Institute of Education to study what factors influence women to participate (or not participate) in elective mathematics courses in high school. The study will include systematic classroom observations, using the secondary observation instrument developed at SRI for the study of secondary school reading classes. The results of this study, which is still in the early stages, will include a considerable body of data about what goes on in high school math classes, which again will add to the evidence about how teacher actions and attitudes affect the learning and educational outcomes of their students.

In selecting the schools in which the study is to be carried out, we found an innercity Oakland high school, which serves primarily low-SES black students, with a very high participation of women in higher mathematics (that is, beyond geometry). In that school, we found a very active Math, Engineering, and Science Achievement (MESA) program, developed by Mary Smith at Oakland Tech, with the result that 67% of those enrolled in higher math were women (in contrast to the 40% in the suburban schools nearer to Stanford University and the University of California, Berkeley).

Upon entering high school, any students who have taken algebra and who show an interest in math, science, or engineering are invited to take part in the MESA program; no tests are required. Once in the program, students who need help are provided with special help and teachers encourage them to stay in the program. High-interest classes are provided with many field trips and speakers to demonstrate how math, science, and engineering function in society. Every effort is made to help the students grasp the practical use of what they learn in books. The success of the program, now 6 years old, can be seen in the fact that 14 black Oakland Tech students have completed the classes in trigonometry, physics, and chemistry and are enrolled in a 4-year university for fall 1978. Prior to the MESA program, black students seldom completed higher math courses--at the most, an average of one a year.

Clearly the MESA program should be of interest to other urban schools. Seemingly, girls are taking more advantage of the MESA program than boys since 67% of the population in higher math classes are girls. Girls in other schools may not receive the type of support and encouragement to continue in math such as the girls as well as boys do in these two schools. Two other Oakland high schools with a much higher SES have a lower percent of girls enrolled in the higher math classes. We are, of course, most anxious to analyze our data to see if we can identify any classroom instructional processes or student, teacher, and counselor attitudes that explain why women in intercity Oakland are more likely to take higher math classes than women in other schools.

It will be most interesting to analyze the classroom observation data for Oakland Teachers to see if classroom instructional processes differ from those in math classes in schools with high-SES students (and fewer women math students).

The primary focus of our study is to identify those factors which promote higher enrollment and achievement and more positive attitudes toward mathematics among high school females. Specifically, the study will (1) identify major personal, social and school-related factors that influence student decisions to enroll in advanced mathematics courses, and (2) identify mathematics interventions or career education programs that promote high enrollment of women in mathematics courses. These factors will be studied in eight high schools in the Greater San Francisco Bay Area which vary on the percentage of women enrolled in mathematics courses. Within each school, systematic classroom observations will be made to determine the effect of the mathematics teacher on students' achievement, attitudes, and future enrollment in math courses. Information on counseling services, career education programs and math intervention programs will also be obtained for each school. The effect of parents will be determined by obtaining information from each student on parents' education, occupations, and expectations concerning their children's math achievement and future enrollment.

All of these factors will be investigated as possible determinants of student grades, attitudes, knowledge of math-related careers, perceived utility of mathematics, and future enrollment in mathematics courses.

A special effort will be made to disseminate findings regarding successful educational practices which promote the enrollment of women in high school mathematics courses. In addition, teachers taking part in the study will be given profiles of their teaching behaviors and an explanation of their performance on the classroom observation variables found to be related to all student outcomes. In this analysis those processes found to be efficient in teaching men and women mathematics at each level will be shared with teachers.

Classroom Research on Hispanic-Background Students

SRI classroom research has not yet focused on Hispanic-background students (Mexican-American, Puerto Rican, Cuban-American) to identify the instructional processes and events that might give different outcomes for them than for students with different ethnic backgrounds.

Several authors have written eloquently in The Chicano Psychology edited by J. L. Martinez, Jr. (1977) and in New Approaches to Bilingual, Bicultural Education by A. Castaneda, M. Ramirez III, and P. L. Herold (1975), arguing that Mexican-American children are likely to differ in cognitive style from white non-Hispanic children as a result of the learning that takes place in their homes and communities. Castaneda, Ramirez, and Herold (1975), in particular, believe that cognitive style develops as follows:

(1) Values and lifestyles of a cultural group affect
(2) Mothers' styles of teaching and child rearing which influence
(3) Children's communication styles, human relational styles, incentive-motivational styles, ways of perceiving and thinking (learning styles), all of which make up
(4) The child's cognitive style.

Castaneda, Ramirez, and Herold (1975) describe two types of cognitive style: field dependent and field independent. Their empirical research suggests that Mexican-American children are more field dependent than are white non-Hispanic children; the two groups differ in their performance on the Portable Rod and Frame Test, a field-sensitive measure. (Not all Mexican-American children are field dependent, any more than all white, non-Hispanic children are field independent; all of us have and use both cognitive styles to one degree or another.) These authors suggest that Mexican-Americans are more field sensitive in cognitive style because their cultural values and training promote that style. They suggest that Mexican-Americans have a greater sense of cooperativeness, more affiliation, strong family ties, a sensitivity to interpersonal relations, and respect for tradition. They believe these qualities are related to field sensitivity and, further, they believe the present school systems are not established to deal with this type of cognition.

They contrast peer relationships in the following way:

> Relationship to Peers
>
> Children differ from one another in human relationship styles. Field independent children are generally task oriented, giving little or no attention to the social environment of the classroom. They enjoy competing with

> classmates. They almost always approach recognition and achievement through individual effort. This kind of relationship to peers is an important characteristic of field independent children.
>
> Field sensitive children generally share a more intimate relationship with their classmates. They enjoy working alongside one another to achieve a common goal. Field sensitive children approach learning as a cooperative and social venture. They help each other, share responsibilities, and seem most comfortable when working in pairs or small groups. Individual competition is as unnatural to these children as it is natural to field independent children. Natural is an important word in this comparison. It has been our experience that field sensitive children do not sit down and formally plan cooperative activities. Instead, they seem almost to drift or migrate in this direction.
>
> Relationship to Teacher
>
> Field sensitive children often relate to teachers in much the same way they do to peers. They generally prefer to interact closely and openly express affection and positive feelings for the teacher. Field sensitive children are noticeably influenced by expressions of approval or disapproval from the teacher. They often actively seek approval (Is this how you wanted me to do it? Do you like the way I did it?).
>
> The relationship of field independent students to the teacher is quite different from this description. Field independent students typically seem to be completely absorbed in what they are doing. They often seem to be working to meet standards they have set for themselves, rewarding themselves with expressions of self-approval when these standards are met. When they seek recognition from the teacher, their interest is primarily centered around correctness rather than the teacher's personal approval. (p. 54)

Castanda, Ramirez, and Herold (1975), page 39, make a case for the fact that schools are primarily oriented to the field-independent learner:

(1) Field independent persons perform better than field sensitive persons on tests which involve separating a part from an organized whole or rearranging parts to make a whole.

(2) Field independent children tend to be "task centered" in taking tests; field sensitive children tend to glance at the examiner and pay more attention to the social atmosphere of the testing situation.
(3) Field sensitive persons appear to be more imaginative in verbally describing social situations. The social environment seems to be more significant for field sensitive persons in other ways. They tend to remember faces and social words better than field independent persons. They are more influenced by expressions of confidence or doubt than are field independent persons.
(4) Students and teachers who share a common cognitive style tend to perceive each other more favorably than do students and teachers whose cognitive styles are dissimilar.

Spencer Kagen and Raymond Buriel in Chicano Psychology (1977) feel that the research accomplished at this time regarding the links between field sensitivity (FDI) and schooling or socialization are still questionable. They feel these tentative relationships do not account for the low percentage of Mexican-Americans who do finish high school. Neither does bilingualism, economics, or self-concept explain the low percentage. These authors do think that prejudice on the part of teachers, unintentional as it might be, does affect the low achievement and the ratio of drop-outs of these students. In an observational study funded by the U.S. Commission on Civil Rights (see Jackson & Cosca, 1974), the researchers found the following statistical differences in 429 classrooms in California:

White, non-Hispanics were praised 36% more often than Mexican-American, and teachers picked up on their ideas 40% more often, responded positively 40% more often, directed questions to Anglos 21% more often. Mexican-American verbal participation was 40% less and they received 35% less attention overall. Jackson and Cosca (1974) suggest it is important for teachers to ask these students an equal number of answerable questions as they ask non-Hispanic whites. If teachers do not call on the Mexican-American students, the students may feel the teacher does not want to hear from them and they may remain quiet.

A paper by Lambert, Evertson, and Anderson (1977) summarized findings from other research based upon Mexican-Americans in the classroom.

> As Good and Brophy (1969) noted in analyzing classroom interactions, the disparity in praise and encouragement may damage the academic self-esteem and motivation of Chicano pupils to the extent that they begin evaluating themselves on the basis of the teacher's differential treatment. The report observes that Chicanos, often because of the language problem, speak less often in class than do Anglos. The Chicanos therefore make fewer contributions which the teacher can praise or encourage. The problem then would seem to lie with the teacher's lack of adequate planning to provide equal response opportunities. (pp. 8-9)
>
> If we use the probability of less positive classroom praise as an example of unintentional inequality of instructional opportunity, we can see that teachers [of Mexican American students or]in low SES classrooms need to plan equalizing structures very thoroughly and deliberately. These equalizing structures must be planned early to ensure fair and appropriate interaction with all students. (p. 10)

Kleinfeld (1975) reminds us that the questions should be stimulating and appropriate. A teacher who is too sympathetic may not be sufficiently challenging. Fernandez, Espinosa, and Dornbush find that praise and warmth alone do not motivate these students (1975). Praise should always be appropriate and expectations should be realistic or the student may pick up false cues as to what is acceptable performance.

Ornstein (1970) observes the following about praise and criticism and the low-SES student:

> To help the child, the teacher should avoid harsh criticism and censure, since this reaffirms the child's belief that the world is to blame for his failure; likewise, it merely perpetuates his negative self-concept. Ideally, the teacher accepts the child as an individual; he recognizes the child's overlooked positive qualities, without romanticizing or creating a false image too far on the other side. He encourages and gives honest praise, careful not to over-praise, for praise becomes ineffective if the child feels it means nothing. (p. 150)

Lambert et al. (1977) remind us that teachers sometimes project differential expectations on students. Of special concern to teachers is physical appearance--neatness and linguistic correctness. Rist (1970) reports that the more "desirable" children, those more proficient in language, were grouped together and seated in the front of the room. Those with less language skill were grouped and seated in the back of the room.

Teachers may be totally unaware of this kind of response to children. The point is that they must be made aware of subconscious acts and change their planning so that all children have a fair chance to grow and prosper.

These studies suggest that teachers should consider the cultural differences as well as the level of achievement when planning programs for their students. Research suggests that Mexican-American students are likely to prosper more in classrooms where the expectations are clear, the instruction is holistic but each incremental step is clear, and where the teacher is supportive, approachable, and warm.

In the light of the above research, it would be of great interest to sort through the data base representing hundreds of classroom observations, find those that represent classrooms with a predominance of Hispanic-background children, and find out what factors in those classrooms are associated with increased scores on standardized achievement tests. While it makes sense that children who come to school from families that have a different culture would have their own values, communication style, incentive motivation style, and learning style, it would be useful to check the natural observations to see whether those differences are perceptible within the data base, whether they are indeed in the direction indicated by the research reported above, and if so, whether those differences persist into secondary school or whether other influences take over (e.g., discouragement, family responsibilities, a sense of injustice, and alienation).

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